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THE KANSAS UNIVERSITY SCIENCE BULLETIN.

Vol. II, No. 13—June, 1904.
(Whole Series, Vol. XII, No. 13.)

CONTENTS:

SNAKES OF KANSAS, ... *Edwin B. Branson.*

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KANSAS UNIVERSITY SCIENCE BULLETIN.

VOL. II, No. 13. JUNE, 1904. {WHOLE SERIES, VOL. XII, No. 13

SNAKES OF KANSAS.

BY EDWIN B. BRANSON.

Submitted in partial fulfilment of the requirements for the degree of Master of Arts.

INTRODUCTION.

THE original intention of the author was to include in this paper only snakes that he knew occurred in Kansas, but he has found it desirable to add descriptions of others that have been reported from the state, the occurrence of which appears doubtful. He has also included descriptions of species that may reasonably be expected to occur in the state because they are found close to its boundaries.

The first list of Kansas snakes was published by Annie E. Mozley in 1878. This list included only those species preserved in the museum of Kansas University. It gave thirty-two species and two subspecies, but the writer has had access to the material used by Miss Mozley and finds only twenty-three valid species and four valid subspecies. *Eutænia sirtalis*, *E. saurita*, *E. parietalis*, *E. marciana*, *E. proxima* and one unidentified species of Garter Snake are listed by Miss Mozley, but the writer has failed to find *Eutænia marciana* and *Eutænia saurita* in the collections. Mozley's *E. sirtalis*, *E. sirtalis dorsalis* and *E. parietalis* belong to the species *sirtalis*. The corrected list of Garter Snakes contains four species—*E. sirtalis*, *E. radix*, *E. proxima* and *E. elegans*. Mozley's *Heterodon cognatus* and *Heterodon atmodes* are now included under *Heterodon platyrhinus*. Mozley's *Ophibolus eximus*, *Ophibolus gentilis* and two unidentified species belong to one species, *Ophibolus doliatus*. *Bascanion flaviventris*, *Bascanion foxi* and *B. constrictor* are synonymous, and are now called *Zamenis constrictor*. *Heterodon simus*, listed by Mozley, proved to be *H. nasicus*.

In 1880 F. W. Cragin published a list of Kansas snakes. The list includes thirty-two species, but the writer, after having examined all of the important collections of snakes in the state, has failed to find the following species and subspecies given in the list: *Heterodon simus*, *Eutænia marciana*, *Eutænia saurita*, *Coluber confinis*, *Coluber vulpinus*, *Tropidonotus sipedon erythrogaster*, and *Diadophis amabilis*. *Heterodon simus*, *Eutænia marciana* and *Eutænia saurita* are listed principally on the authority of Mozley. As Cragin's list is a compilation not verified by himself, I shall need further evidence before including the eight species given above as Kansas snakes.

In this paper nearly all species that have been reported from Kansas are described, but those that the writer has not met with during his investigations are marked doubtful. The writer has examined the collections at the State University, state-house, Washburn College, Ottawa University, State Normal School, State Agricultural College, and several high schools in the state, is familiar with the local fauna of Brown, Douglas and Republic counties, has collected in the central, northern, eastern, southern and western parts of the state, and believes that if he has not met with any specimens of a species there are good grounds for believing that that species is not found in Kansas. Thirty-nine species and subspecies are listed in this paper. The localities where specimens have been captured are given with descriptions.

The nomenclature used by Cope in his "Crocodilians, Lizards, and Snakes" (1900) has been used in this work, excepting where change seemed absolutely necessary. In such cases the nomenclature employed by Brown (5, 1901) is used. The synonymic lists are taken from the works above mentioned. The common names used are those given by Yarrow in his "Check-list of Reptilia and Batrachia."

The descriptions given in this paper are for the most part based upon living specimens; where this is not the case it is noted in the description. Alcohol and formalin do not preserve colors, so that descriptions of preserved specimens are not entirely satisfactory. Ridgeway's "Nomenclature of Colors" has been used as a guide in determining colors. Many of the drawings are original, having been made by the author. All bor-

rowed drawings are taken from Cope's "Crocodilians, Lizards, and Snakes."

Only four species of venomous snakes are known to occur in Kansas, but I think it quite probable that one other species, the Water Moccasin, occurs in the southeastern part of the state. The poisonous snakes are the Timber Rattlesnake (*Crotalus horridus*), the Prairie Rattlesnake (*Sistrurus catenatus*), the Massasauga (*Crotalus confluentis*), and the Copperhead (*Ancistrodon contortrix*). Rattlesnakes are easily distinguished from harmless snakes by their rattle. All of the poisonous snakes found in Kansas have a deep pit between the eye and the nostril, erectile poison fangs in the anterior part of the upper jaw, and the pupil of the eye shaped like a double convex lens.

Little is known concerning the habits of snakes. Perhaps more negative than affirmative facts are at hand, for almost all popular beliefs concerning them are untrue. The number of rattles is no indication of the age of Rattlesnakes. It is probably untrue that snakes swallow their young. Snakes do not molt every time they eat. The breath of snakes is not poisonous. Many of the so-called poisonous snakes are harmless. (See list of poisonous snakes above.) Habits, as far as known, are given with the descriptions of the species.

My thanks are especially due to Prof. C. E. McClung, under whose direction this work was prepared, for placing at my disposal all of the herpetological collections of the University of Kansas and for aiding me in obtaining specimens from various parts of the state. I wish here to express my obligations to Prof. F. W. Cragin for some valuable notes on Kansas snakes; to Professor Popenoe, of Kansas State Agricultural College, Professor Riggs, of Ottawa University, Professor Wooster, of Kansas State Normal School, Professor Grimsley, of Washburn College, and Mr. Rumold, of Beloit high school, for the privilege of examining the collections under their charge.

ORDER *OPHIDIA.*

Body elongated, slender; covered with scales. Limbs wanting (vestigial hind limbs present in some species). Mandibles loosely articulated, quadrate long and freely movable. Shoulder girdle absent. No eyelids or external organs of hearing.

KEY TO FAMILIES.

No pit between eye and nostril. No erectile fangs. Pupil of eye round ..... COLUBRIDÆ.

Pit between eye and nostril. Erectile fangs. Pupil of eye elongated, vertical ..... CROTALIDÆ.

COLUBRIDÆ.

I.—Dorsal scales carinated.

a.—Anal entire.

Scales in 27–33 rows ..... *Pityophis.*
Scales in 17–23 rows ..... *Eutaenia.*
Scales in 19 rows. One nasal ..... *Tropidoclonium.*

b.—Anal divided.

1.—Loreal present.

Scales in 17 rows. One nasal ..... *Cyclophis.*
Scales in 23–25 rows. Rostral large, recurved ..... *Heterodon.*
Scales in 19–29 rows. Gastrosteges less than 170 ..... *Natrix.*
Scales in 27–35 rows. Gastrosteges more than 170 ..... *Coluber.*

2.—Loreal absent. Scales in 15–17 rows ..... *Storeria.*

II.—Dorsal scales smooth.

a.—Anal entire.

Urosteges in two series ..... *Ophibolus.*
Urosteges undivided ..... *Rhinochilus.*

b.—Anal divided.

Scales in 13 rows. One nasal. No anteorbital ..... *Carphophiops.*
Scales in 15–17 rows. A pale ring on the neck ..... *Diadophis.*
Scales in 15 rows. Color green ..... *Liopeltis.*
Scales in 15–19 rows ..... *Zamenis.*
Scales in 15 rows. No loreal ..... *Tantilla.*
Scales in 13–17 rows. One nasal. Anteorbital present ..... *Contia.*

CROTALIDÆ.

I.—Rattle present.

1.—Top of head with plates ..... *Sistrurus.*
2.—Top of head with scales ..... *Crotalus.*

II.—No rattle present ..... *Ancistrodon.*

COLUBRIDÆ

PITYOPHIS Holbrook.

Pityophis Holbrook, N. Amer. Herpetology, IV, 1842, p. 7; Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 64.

Churchilla Baird and Girard, Reptiles in Stansbury's Expl. Great Salt Lake, 1852, p. 350.

Maxillary teeth equal. Rostral high, recurved. Loreal present. One preocular (occ. two). Three to six prefrontals. Two nasals. Head broad behind. Size large. Body spotted.

KEY TO SPECIES.

Rostral prominent; head bands distinct; head long; spots small and numerous. *P. catenifer.*

Rostral more prominent; no head band; head short; spots few and large. *P. melanoleucus.*

Pityophis catenifer Blainville.

Bull Snake. Western Pine Snake.

Coluber catenifer Blainville, Nouv. Ann. Mus. Hist. Nat., LV, 1835, p. 290.

KEY TO SUBSPECIES OF CATENIFER.

Rostral very high, recurved..... *P. catenifer sayi.*
Rostral lower, less curved..... *P. catenifer bellona.*
Rostral low and broad..... *P. catenifer catenifer.*

Pityophis catenifer sayi Schlegel.

Bull Snake.

Coluber sayi Schlegel, Ess. Phs. Serp., II, 157, 1837.

Pityophis sayi Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 151.

Pityophis mexicanus Dumeril and Bibron, Erp. Gen., VII, 1854, p. 236.

Pityophis sayi sayi Cope, Check-list N. Amer. Batr. Rept., 1875, p. 39.

Dorsal scales in twenty-seven to thirty-three rows; all keeled excepting first five to ten rows. Occipitals broken up into many small plates posteriorly. Superciliaries broad behind, narrow in front. Prefrontals 3–7. Internasals rounded in front. Rostral very high, strongly curved. Two nasals—anterior larger; nare mostly in posterior. Loreal trapezoidal. Oculars 1–3 (occ. 2–3). Superior labials 8–10; seventh and eighth largest, fifth entering orbit. Inferior labials 10–13,

seventh largest. Pregenials very large. Postgenial very small. Gastrosteges 220–240. Urosteges in two series, 45–60. Anal entire.

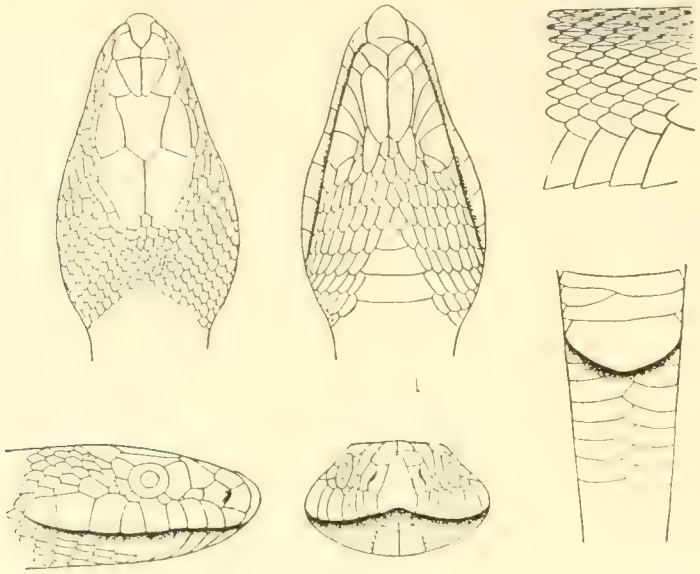

FIG. 1.
Pityophis catenifer sayi Schlegel.

Color above, yellowish to reddish brown. Three series of dorsal spots, reddish brown to black. Forty to seventy on body; median spots largest, elongated anteriorly. Anterior spots in second series frequently coalescing, forming a dark stripe. Two or three more or less well-defined lateral series of lighter spots. These frequently form black stripes anteriorly. Narrow white stripes between the anterior dark stripes. A series of black spots on the margin of the gastrosteges, involving a part of the first row of scales. Belly whitish; large black blotches down the middle. Throat and chin white, with small black spots. First eight or nine inferior labials margined with black. Top of head whitish or yellowish, with brown or black spots or cross-bars. Only one complete cross-bar present. It crosses the anterior part of the frontal. A dark stripe from orbit to angle of mouth generally present.

Body large and strong. Neck slightly constricted. Head pointed. Tail short and slender. Eye large.

The following are the scuta, dimensions and number of spots of seven specimens from Douglas county:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges.	Upper labials.	Lower labials.	Scales.	Tail spots.	Body spots.
63½	6⅛	235	53	9- 9	12-12	32	10	50
48	5¼	232	48	8- 9	12-11	29	12	57
67½	8	226	59	9- 9	13-13	29	9	49
55	5½	232	49	9- 8	13-10	29	12	40
62	7½	226	58	9- 9	14-13	31	12	53
50	5¼	232	48	8- 9	13-12	30	11	56
47	6	234	55	9-10	.....	31	10	54

The Bull Snake is the largest and one of the most abundant of Kansas snakes. Individuals nine feet long are sometimes found. The adults are very gentle, offering little or no resistance when handled, but the younger individuals will fight vigorously.

The 15th of last August, twelve snake eggs were brought to me by a farmer living near Lawrence. I opened one of them immediately, and found it contained a Bull Snake eight inches long. The snake was surrounded by a gelatinous mass. Its color was olive-buff, with spots faintly outlined in a darker shade. The cephalic plates were well developed. It was able to raise its head about one-third of an inch, but it could not open its mouth. It could see large moving objects. The hemipenis was protruded, and small calcifications were already present on it.

I placed the other eggs in damp sand where the direct rays of the sun could not reach them. The weather was cool and damp most of the time to the period of their hatching. September 28 two snakes hatched and during the next three days eight more came out of the eggs. They were fifteen to fifteen and one-half inches long. They were fat, and it seemed incredible that they could have come out of such small eggs. The eggs were $2\frac{4}{5}$ inches in length by $4\frac{4}{5}$ in circumference. The young snakes were like adults in scutellation and coloration. They were very irritable, hissing and striking at whatever came near them. Before they were entirely out of the egg they hissed and struck. They could not strike accurately until they were several weeks old. Their teeth were very small and weak. I allowed them to strike my hand, but they could do no injury. They did not open their mouths wide enough when striking, and the point of the nose struck the offending object. I often thrust my finger into their

mouths but they did not try to close their jaws. At the age of two months they had become quite gentle, but they would strike and hiss occasionally when startled. They were still not able to inflict any injury. Their length had increased to eighteen inches. October 19 they began to molt. Conditions were not favorable and the process took several days. The skin being molted was so thin and delicate that it broke and was sloughed off in patches.

I buried five young Bull Snakes and one adult December 5. I placed them in a box partially filled with earth and rubbish and buried them about two and one-half feet deep. I took them up again March 10. They were all in good condition, but were not very active until April 10. For three or four days after this the young snakes were very active and would crawl rapidly towards the cage door and try to escape whenever it was opened. They were more pugnacious than they had been when placed in their winter quarters. April 15 I fed them, using a pipette with a large rubber bulb at the end, filling the pipette and bulb with a half mixture of egg and water, thrusting the tube down their throats about six inches, and forcing the contents into their stomachs. This was the first food they had taken since their birth. They were at this time nineteen inches in length. The taking of food brought back some of their pugnacity, for they hissed and struck whenever disturbed. They were still unable to inflict a wound on one's hand.

The Bull Snake feeds upon rats, mice, gophers, birds, and other small animals. One, three feet in length, that I had in this laboratory last summer, swallowed three fully grown sparrows for one meal and the next day it swallowed a pigeon egg. It is now six months since this snake's big meal and it has eaten nothing more. This snake molted twice from July 1 to January 1.

The Bull Snake occurs throughout the state. It has been reported from Franklin, Republic, Cloud, Brown, Mitchell, Shawnee, Lyon, Doniphan, Clay, Harvey, Sumner, Ford, Pottawatomie, Sherman, Phillips, Osborne, Greenwood, Neosho, Jefferson, Wallace, Scott, Gove, Clark and Logan counties.

EUTAENIA Baird and Girard.

Thamnophis Fitzinger, Syst. Rept., 1843, p. 558.

Eutaenia Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 24.

Eutaenia Cope, Proc. Amer. Phil. Soc., 1886, p. 495.

Scales keeled in from seventeen to twenty-three rows. Loreal one. Nasals two. Nine normal head-plates. Anal entire. Subcaudals in two series. Temporals normally 1–2 (occ. 2–3 or 1–1). Head distinct. Body moderately stout to very slender. Tail long.

All Kansas species have one dorsal and two lateral stripes. Usually two rows of spots between dorsal and lateral stripes.

Eutaeniæ are the most abundant snakes in Kansas. They occur in all parts of the state. Professor Cope ascribes their abundance to their fecundity and their readiness to seek concealment. Professor Baird mentions one specimen that produced eighty young at a birth. These snakes frequent the water and live on frogs, small fish, etc. Some of the larger snakes will bite viciously when captured. They often remain in captivity for months without becoming tame.

KEY TO KANSAS SPECIES.

I.—Lateral stripe on third and fourth rows of scales; temporals 1–2.

1.—Scales in nineteen rows; superior labials eight. Tail generally less than one-third the total length; body slender ..... *E. proxima.*

2.—Scales in twenty-one rows; superior labials seven; tail usually less than one-fourth total length; body stouter ..... *E. radix.*

II.—Lateral stripe on second and third rows of scales.

1.—Superior labials eight (occ. seven); scales in twenty-one rows. *E. elegans.*

2.—Superior labials eight (occ. seven); scales in nineteen rows. *E. sirtalis.*

Eutaenia proxima Say.

Long's Garter Snake.

Coluber proximus Say, Long's Exped. Rocky Mts., I, 1823, p. 187.

Eutaenia proxima Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 25.

Eutaenia faireyi Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 25.

Eutaenia proxima Cope, Check-list N. Amer. Batr. Rept., 1875, p. 40.

Dorsal scales in nineteen rows, all keeled. Outer slightly notched at tip, all other rows deeply notched.

Frontal elongate, sides concave. Temporals 1–3. Orbitals 1–3. Superior labials eight, second, third, fourth, fifth and

seventh higher than long; sixth largest. Inferior labials ten, fifth and sixth largest. Gastrosteges 170. Urosteges 105. Anal entire. Head distinct; body slender; tail long and slender.

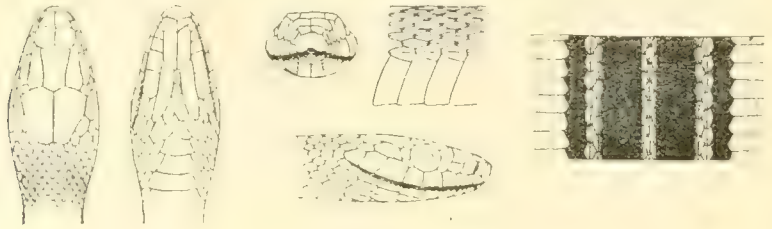

FIG. 2.
Eutaenia proxima Say.

Color above uniform, dark brown to black. On stretching the skin white lines are visible. A dorsal stripe covers one one row and two half-rows of scales. It is usually bright yellow, but is sometimes very dark or greenish. Lateral stripes on third and fourth rows of scales, greenish yellow. Belly greenish; no gastrostegal spots. Orbitals whitish.

The following are the scutellation and dimensions of eight specimens from Douglas county in the University museum:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges.	Scales.
25⅛	7⅛	166	105	19
20	6	169	99	19
26½	7⅜	175	110	19
20⅜	5½	174	...	19
22½	6¼	171	102	19
21	5¼	177	...	19
19¾	6¼	106	...	19
15¼	4	169	105	19

Occurs throughout the state. I have examined specimens from Wallace, Douglas, Franklin, Geary, Woodson, Clark and Shawnee counties.

Eutaenia radix Baird and Girard.

Racine Garter Snake.

Eutaenia radix Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 34.

Eutaenia haydenii Kennicott, Rept. U. S. Pac. R. R. Survey, XII, Suppl. I, 1859, p. 298.

Eutaenia radix Cope, Check-list N. Amer. Batr. Rept., 1875, p. 40.

Twenty-one rows of dorsal scales. First row broad as long, and slightly or not notched. First row usually not keeled.

Frequently the occipitals are truncate behind. A specimen now before me has long, pointed occipitals, a scale and a half projecting between them posteriorly. The frontal has no truly characteristic shape. The specimen with the large occipitals has a shield-shaped frontal. One with short and truncate occipitals has a short and abruptly terminating frontal. One preocular, touching or nearly touching the frontal. Loreal medium, quadrangular. Rostral high. Two nasals, nare almost entirely in anterior. Three postoculars (occ. two). Seven superior labials, fifth and sixth largest; third and fourth entering the orbit. Inferior labials ten (occ. nine or eleven), fifth largest. Postgenials longer than pregenials. Anal entire. Urosteges 55–85. Gastrosteges 150–170.

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
22½	5½	151	71	21
11½	3	166	84	21
19	..	161	..	21
32	6¾	166	75	21
33	7	150	70	21
10½	2½	160	81	21

FIG. 3.
Eutaenia radix B. and G.

Dorsal stripe golden yellow, covering one row and two half-rows of scales. Lateral stripe light yellow, interrupted by black maculations. In places it covers a half-row of scales; in other places it broadens, covering one and one-half rows. Where it covers only a half-row, that row is the upper half of the third. (Fig. 3.) Ground color above light brown. Two rows of black spots on each side of the dorsal stripe. These spots alternate with each other. They are one scale long and three scales wide. Below the lateral stripe is a row of black spots covering three scales and a small part of a gastrostege dorso-ventrally. They are one scale long. Belly greenish; one or two black spots near the end of each gastrostege. Under part of head yellowish. Top of head brown. Superior labials greenish, with

broad black borders. Some black on the postoculars and loreal. The last two or three inferior labials maculated with black.

There are three color varieties of this species. Two of these varieties are represented in Kansas. In one the ground color is so dark that the spots are obscured; in the other the ground color is light and the spots are very distinct.

Head distinct from body. Body thick. Tail from one-fourth to two-ninths of the total length. This is the largest Garter Snake in Kansas. One now in this laboratory is thirty-four inches in length. It is slow in its movements and seldom attempts to bite.

It has a wider distribution and occurs in greater numbers than any other Kansas Garter Snake. I have examined specimens from Geary, Lyon, Douglas, Franklin, Mitchell, Clay, Republic, Ellis, Rawlins, Wallace, Scott, Logan, Gove and Riley counties.

Eutaenia elegans Baird and Girard.

Boyd's Garter Snake.

Eutaenia elegans Baird and Girard, Cat. Rept. N. Amer., Pt. I., Serp., 1853, p. 34.

Tropidonotus vagrans Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 202.

Only one variety of *elegans* occurs in Kansas. Cope (10. 1034)* gives eight varieties as occurring in North America. Brown (5. 22) gives five varieties. His key to the subspecies is as follows:

a.—Post-oral crescent absent:
Color dark; spots and lateral stripes often indistinct. *E. elegans elegans.*
Color lighter: spots encroaching on stripes.... *E. elegans vagrans.*
Often 2 preoculars and 23 rows; otherwise like *vagrans.* *E. elegans biscutata.*

b.—Post-oral crescent present:
Spots and stripes distinct..... *E. elegans marciana.*
Spots and stripes indistinct or absent..... *E. elegans couchi.*

Eutaenia elegans vagrans Baird and Girard.

Wandering Garter Snake.

Eutaenia vagrans Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 35.

Tropidonotus vagrans Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 202.

Thamnophis vagrans Stejneger, N. Amer. Fauna, No. 7, p. 213.

*First number refers to bibliography number printed at the end of this bulletin; second number refers to the page of the cited publication.

FIG. 4.
Eutaenia elegans vagrans B. and G.

Twenty-one rows of dorsal scales, all keeled; first row indistinctly. Frontal short, nearly as broad posteriorly as anteriorly. Parietals broad. Occipitals short, broad. Prefrontals wider than long. Internasals triangular. Two nasals. One preocular; three postoculars. Temporals 1–2. Upper labials eight, sixth and seventh largest; third and fourth entering the orbit. Lower labials ten, sixth largest. Pre- and postgenials of about equal length. Outer two or three rows of scales notched. Gastrosteges 150–175. Urosteges 55–90. Anal entire.

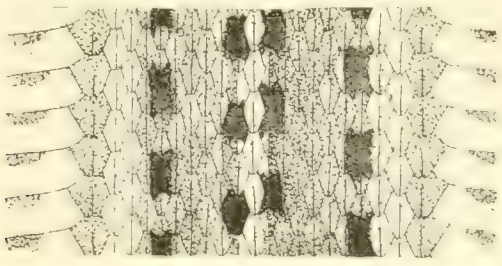

FIG. 4*a*.
Eutaenia elegans vagrans B. and G.

Color above yellowish to brown. Dorsal stripe narrow. The spots next the dorsal stripe limit it to one row of scales in places. The spots are small and are not arranged symmetrically on each side of the dorsal stripe. Stripes whitish or yellowish. Belly dark greenish to bluish, darker toward the middle. Top of head dark brown, usually with small parietal spots. Upper labials greenish, faintly bordered with black. Chin and throat yellowish.

Head distinct. Body long and slender. Tail about one-fourth total length.

This snake is quite rare in the western part of Kansas. None have been reported from the eastern part.

Eutaenia sirtalis Linnæus.

Coluber sirtalis Linnæus, Syst. Nat., 10th ed., 1758, p. 222.

Eutaenia sirtalis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 31.

Eutaenia sirtalis Cope, Check-list N. Amer. Batr. Rept., 1875, p. 41.

Body rather stout. Tail one-fourth to one-fifth total length. Head distinct. Temporals 1–1, 1–2, or 1–3. Oculars 1–3 (occ. 1–2 or 1–4). Scales in nineteen rows (occ. 17 or 21). Usually three rows of spots on each side of the dorsal stripe. Parietal spot usually present.

KEY TO KANSAS SUBSPECIES.

1.—Spots distinct; not separated by red interspaces ..... *E. sirtalis sirtalis.*
2.—Spots often obscure; separated by red interspaces... *E. sirtalis parietalis.*

Eutaenia sirtalis parietalis Say.

Say's Garter Snake.

Coluber parietalis Say, Long's Exped. Rocky Mts., Pt. I, 1823, p. 186.

Eutaenia parietalis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1852, p. 28.

Eutaenia sirtalis parietalis, Cope, Yarrow's Reptilia, U. S. Geog. Surv. W. 100th Mer., V, 1875, p. 546.

Eutaenia sirtalis dorsalis, *Eutaenia sirtalis obscura*, *Eutaenia elegans ordinoides*, Cope, Proc. U. S. Nat. Mus., XIV, 1892, pp. 654–664.

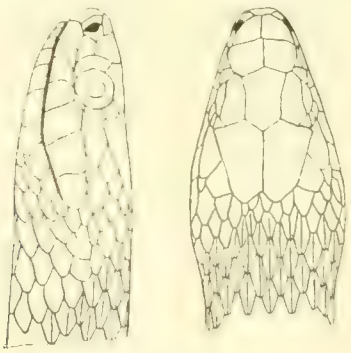

FIG. 5.
Eutaenia sirtalis parietalis Say.

Nineteen rows of scales, outer row faintly keeled, other rows strongly keeled; scales usually slightly notched. The frontal is broad in front; its interior border is convex; no sharp angle in the lateral border. Superciliaries tapering to a point in

front, moderately broad behind. Angles of occipitals decided; occipitals broad. Prefrontals large, wider than long. Internasals large, triangular. Rostral large. Nasals two, narial opening in anterior. Loreal large, lower margin longer than upper. One preocular. Two to four postoculars. Temporals 1–3, 1–2, or 2–3. Seven, rarely eight, superior labials. Ten, rarely nine or eleven, inferior labials. Gastrosteges 150–170. Urosteges 60–80. Anal plate entire.

Dorsal stripe red or yellow to bluish; lateral stripe rarely yellowish, often blending with the color of the belly; belly greenish or bluish; large and distinct spots near the tips of the gastrosteges. Not infrequently these spots have almost entirely disappeared. The head is brownish above; superior labials greenish, bordered with black posteriorly; under part of head yellowish white. In some specimens the color between the stripes is uniformly blackish. (See remarks on *obscura*.) In the usual marking the superior row of spots has fused next the dorsal stripe. Often the superior row appears as a plain black stripe. The spots of the second row are separated by red interspaces. Frequently the red has almost entirely disappeared. In one living specimen now before me, only very small red spaces are present anteriorly and none posteriorly. The row of scales between the lateral stripe and the gastrosteges is sometimes maculated with black spots and sometimes colored like the belly.

Although not a water snake, *E. sirtalis parietalis* is seldom found far from water. It feeds upon small frogs, fish, and other small land and water animals. *E. sirtalis sirtalis*, like all other *Eutaeniæ*, is ovoviviparous. It is quite abundant along streams in the eastern part of the state but is rare in the western part. I have examined specimens from Mitchell, Shawnee, Douglas, Lyon, Franklin, Jefferson, Republic, Wallace and Riley counties.

The accompanying drawings (figs. 6, 6*a*, 6*b*) show some of the variations in color of this subspecies.

Cope (10. 1074) describes his *E. sirtalis obscura* as being uniformly blackish between the longitudinal stripes, the keels of the scales being of a lighter brown than in *E. sirtalis parietalis*, the belly being grayish green, with black spots near the ends of the gastrosteges, extending from the base. He says: "In no

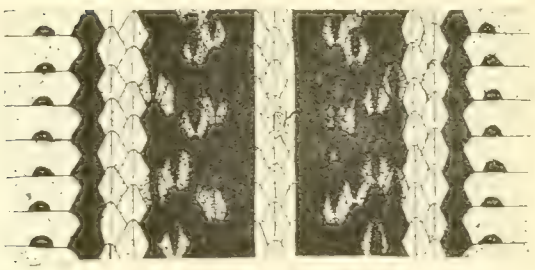

FIG. 6.
Eutaenia sirtalis parietalis Say.

FIG. 6*a*.
Eutaenia sirtalis parietalis Say.

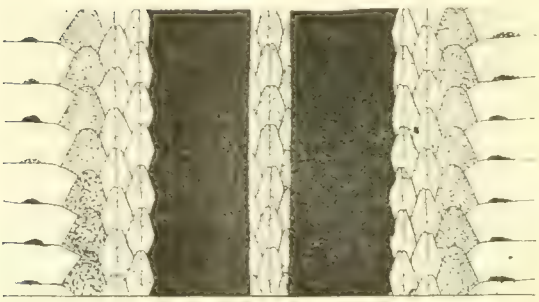

FIG. 6*b*.
Eutaenia sirtalis parietalis Say.

other specimen have the spots disappeared by fusion, leaving the stripes intact so perfectly as in this specimen. In those individuals from Lac qui Parle, Minn., the fusion is complete as to the superior row of spots, but the inferior may be seen faintly outlined on stretching the skin, as in some of the dark forms of *E. sirtalis parietalis.*"

Then, according to Professor Cope's own description, there is no difference in coloration between the Lac qui Parle specimens of *E. sirtalis obscura* and dark forms of *E. sirtalis parietalis.* As coloration is the only distinguishing mark for these subspecies, why does he call these specimens *obscura* instead of *parietalis?* In the museum of Kansas University is a large number of specimens of *E. sirtalis parietalis* from Douglas county. These show all gradations of color from Cope's *E. sirtalis obscura* to *E. sirtalis parietalis,* but after studying the specimens carefully I find nothing that warrants the distinguishing of *E. sirtalis obscura* as a subspecies, and I include all the specimens under *E. sirtalis.* The drawings here given show the variations of *E. sirtalis parietalis* as represented in the Kansas University museum.

Cragin (11. 119) reported *E. sirtalis ordinoides* from Kansas. Cope distinguishes this subspecies from *E. sirtalis parietalis* by the color between the lateral spots being chestnut instead of red, and by its having twenty-one rows of scales and eight upper labials. *E. sirtalis parietalis* varies in color and scutellation enough to include this subspecies. A specimen recently brought to this laboratory agrees with Cope's *E. sirtalis ordinoides,* but there can be no doubt of its being *E. sirtalis parietalis.*

Mozley (20. 34) reported *E. sirtalis dorsalis* from Kansas. I have examined the specimens upon which this report was based, and am sure that they should be referred to *E. sirtalis parietalis.* Cope (10. 1076) describes this subspecies as follows: "Lower surfaces and lateral stripe olivaceous; gastrosteges with a small black spot near each end. Dorsal stripe red, with a delicate black or deep brown border on each side. Space between dorsal and lateral stripes brown, marked with a single series of small black spots, which occupy parts of three rows of scales next to the lateral stripe, and do not, therefore, reach the dorsal stripe. Spaces between the lateral spots red." Further, he says that the gastrostegal spots are smaller, more

isolated and rounded than in *E. sirtalis sirtalis*, and are sometimes not present on some of the gastrosteges. No marked differences between *E. sirtalis dorsalis* and *E. sirtalis parietalis* are described here and it seems far-fetched to call *E. sirtalis dorsalis* a subspecies.

Eutaenia sirtalis sirtalis Linnæus.

Garter Snake.

Coluber sirtalis Linnæus, Syst. Nat., 10th ed., 1758, p. 222.

Eutaenia sirtalis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 30.

Eutaenia sirtalis sirtalis and *E. sirtalis semifasciata* Cope, Check-list N. Amer. Batr. Rept., 1875, p. 41.

Scutellation same as in *E. sirtalis parietalis*. Gastrosteges 140–170. Urosteges 70–90. Nineteen rows of scales. Seven upper labials. Oculars 1–3. Temporals 1–2, 1–1, or 1–3.

Color brown or greenish above. Spots usually distinct, sometimes obscure, arranged same as in *E. sirtalis parietalis*. Dorsal stripe without dark border. Spots often confluent anteriorly. Lateral stripe greenish, lighter than belly. One or two dark spots near the ends of each gastrostege. Top of head brownish. Superior labials greenish, bordered posteriorly with black. Inferior labials and under part of head yellowish white. No red between the lateral spots.

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
22	5½	162	89	19
27¾	8¾	158	80	19
27¼	..	152	..	19

I have examined several specimens which agree with Cope's description of *E. sirtalis semifasciata*. The following is Cope's description of that form (10. 1075): "The peculiarity of the form consists in the fact that on the anterior fifth or sixth of the length of the body the spots of the anterior row extend across the lateral stripe, breaking it up into sections. In many of the specimens the spots of the superior row become opposite to those of the inferior row and join them, and the latter again join a row which is below the lateral stripe. The three rows of spots thus become confluent, form cross-bars, interrupted only by the median dorsal stripe."

This slight variation in the arrangement of spots does not

seem sufficient to warrant placing these specimens in a separate subspecies. In a number of specimens from Douglas county in Kansas University museum all gradations in marking between *E. sirtalis sirtalis* and *E. sirtalis semifasciata* are present; so I list all of these specimens as *E. sirtalis semifasciata*. The calling of this variety a subspecies is another example of Cope's readiness to base subspecies on slight, variable and unimportant color markings.

E. sirtalis sirtalis occurs in all parts of Kansas, but is not as numerous as *E. sirtalis parietalis*. I have examined specimens from Douglas, Lyon, Mitchell, Wallace and Shawnee counties. One specimen from Woodson county is in the National Museum.

TROPIDOCLONIUM Cope.

Tropidoclonium Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 76.

Dorsal scales in nineteen rows; all keeled excepting first and second rows. Cephalic scuta normal. Two internasals. One loreal. Urosteges in two series. One nasal. Rostral low. Teeth equal. Head not distinct from body.

Tropidoclonium lineatum Cope.

Lined Snake.

Microps lineatus Hallowell, Proc. Acad. Nat. Sci. Phila., 1856, p. 24.
Tropidoclonium lineatum Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 76.
Ischnognathus lineatus Boulenger, Cat. Snakes Brit. Mus., I, 1892, p. 289.

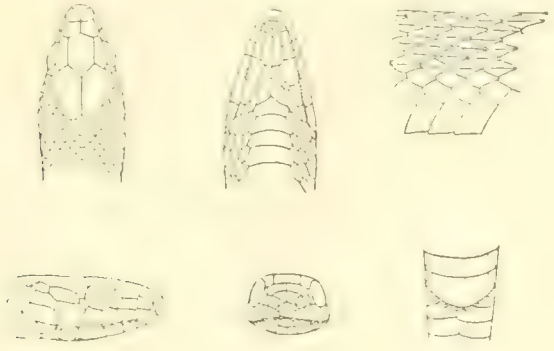

Fig. 7.
Tropidoclonium lineatum Hal.

Dorsal scales in nineteen rows, all keeled excepting the first and second rows; first row as broad as long. Frontal small and regular in shape; longer sides parallel; anterior border

with a very large angle. Parietals narrow and short. Prefrontals almost square. Internasals right-triangular. Rostral wide and very low. One nasal; nare in anterior part. Loreal longer than high. One preocular. Two postoculars. Temporals 2–2. The lower temporal in the first row extends down between the fifth and sixth labials. Supralabials six, fifth and sixth largest. Infralabials six, fourth and fifth largest. Pregenials longer than postgenials. Anal entire. Urosteges in two series.

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
6¼	7/8	143	33	19
10	1⅝	141	43	19
5¼	..	141	..	19
13	1¾	140	33	19
12½	1½	153	33	19

The above are the dimensions and scutellation of five specimens from Douglas county in the University museum.

Color above light brown to dark brown. In the lighter colored specimens there is a row of black dots on each side of the dorsal stripe and another row near the lateral stripe. A dorsal stripe covering one and two half-rows of scales extends from the occiput to the tip of the tail. A lateral stripe is present on the second and lower half of the third row of scales. The dorsal stripe is yellowish. The lateral stripe yellowish mottled with brown. Inferior row of scales brownish. Margin between scales and gastrosteges whitish. Belly greenish, with two rows of triangular black spots down the middle. The color is darker green between the spots. Upper part of head mottled with black and brown. Superior labials drab. The lower part of the temporals of the same color. Under part of the head whitish; often maculated with small black spots.

This snake is found throughout the state. On account of its retiring habits and its small size it is little known. It lives under rotting timber, etc. It does not become exterminated as civilization advances, but lives in large numbers under sidewalks and trash piles in cities. Several specimens from Douglas county are in the University museum. I have examined specimens from Mitchell, Shawnee, Republic, Lyon, Leavenworth, Scott, Logan, Gove and Riley counties.

CYCLOPHIS Gunther.

Cyclophis Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 119.

Head distinct, scuta normal. One nasal plate, one preocular. Teeth equal, smooth. Anal and caudal scuta divided. Scales keeled, bifossate.

Cyclophis æstivus Linnæus.

Keeled Green Snake.

Coluber æstivus Linnæus, Syst. Nat., I, 1766, p. 387.

Cyclophis æstivus Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 11.

Fig. 8.
Cyclophis æstivus Linn.

Head elongate ovoid. Neck contracted. Frontal plate elongated, subpentagonal, diminishing posteriorly, though not acute. Parietals elongated, tapering posteriorly, and subtruncated. Prefrontals subrounded; internasals smaller than prefrontals by about one-fourth. Rostral rounded, broader than high. Nostril in the middle of the nasal. Loreal subtrapezoidal. Superciliary well developed, irregularly oblong. A large, narrow first temporal shield and two large ones following. Upper labials seven, sixth slightly the largest. Lower labials eight, fifth the largest. Posterior mental scutellæ slender and elongated, extending beyond the fifth lower labial. Scales subelliptically elongated, strongly carinated, except the outer row, which is perfectly smooth, and the second row, which is but slightly carinated. These two outer rows are broader than the rest, especially the outermost. Temporals 1–2. Scales in seventeen rows. Gastrosteges 150–165. Urosteges 110–140.

Green above; labials and below light yellow. Tail two and one-half times in total length.

Two specimens from Kansas are in the National Museum, one from Woodson county and one from Riley. I have not seen a specimen from Kansas. If it still occurs in the state it is very rare. The preceding description is taken from Cope's "Crocodilians, Lizards, and Snakes."

HETERODON Latreille.

Heterodon Latreille, Hist. Nat. des Rept., IV, 1799, p. 32; Baird and Girard, Cat. N. Amer. Rept., 1853, p. 51; Boulenger, Cat. Snakes Brit. Mus., II, 1894, p. 153.

Posterior maxillary teeth much enlarged. Rostral plate very high, with upturned edges and anterior face flat. A small azygous plate behind the rostral. In two species there are several other small plates near the azygous. Anal plate divided. Caudal scutella in two series. Scales keeled, in 23–25 rows.

The Spreading Vipers are commonly supposed to be very poisonous. It is hard to understand how they received this reputation, as they are harmless. It may be because of their ugliness, or because they are often mistaken for Copperheads and Copperheads mistaken for them. Scientists considered them poisonous because the posterior maxillary teeth are much enlarged. It is now known that they are not poisonous.

KEY TO SPECIES.

I.—No scales between prefrontals.....*H. platyrhinus.*
II.—Prefrontals separated by scales:
1.—Scales in 25 rows. Prefrontals separated by scales.....*H. simus.*
2.—Scales in 23 rows. Prefrontals and internasals separated by scales. *H. nasicus.*

Heterodon platyrhinus Latreille.

Spreading Viper.

Coluber heterodon Daudin, Hist. Nat. Rept., VII, 1799, p. 153.

Heterodon platyrhinus Latreille, Hist. Nat. des Rept., IV, 1800, p. 32; Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 51.

Heterodon niger, *H. cognatus*, *H. atmodes*, Baird and Girard, Cat. N. Amer. Rept., 1853, Pt. I, Serp., pp. 54, 55, and 57.

Twenty-five rows of scales; inferior row not keeled; scales rounded at the tips. Frontal wide anteriorly, narrowing rapidly toward the posterior end. Superciliaries very wide, longer than the frontal. Occipitals pentagonal, short and narrow. Prefrontals of medium size, irregularly pentagonal. Internasals triangular, with the apex pointing inward. Rostral prominent, but not as large as in *H. nasicus*. Azygous plate extending half-way between prefrontals. Rostral extending half-way between internasals. Loreal short, much higher than long. Oculars nine to eleven. Upper labials eight. Lower labials generally eleven. Temporals 3–4 or 4–4. Gastrosteges 125–150. Urosteges 40–60.

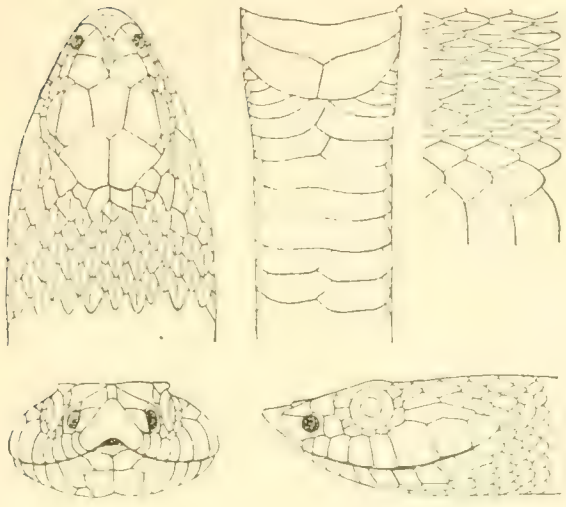

FIG. 9.
Heterodon platyrhinus Latr.

The following are the scutellation and dimensions of four specimens from Douglas county in the Kansas University museum:

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
26	$5\frac{3}{4}$	134	49	25
31	$6\frac{1}{2}$	135	53	25
$30\frac{7}{8}$	$4\frac{3}{4}$	147	43	25
$31\frac{1}{2}$	$4\frac{1}{2}$	140	43	25

Color above brown to black. Black specimens are rare. A dorsal series of dark quadrate blotches separated by interspaces of one to two scales. Margins between blotches and interspaces frequently white. Small dark oval to round blotches alternate with the dorsal. Two black blotches on the nape. Belly greenish to yellowish white, occasionally black. Top of head lighter than dorsal blotches. A black line across prefrontals and preoculars joins the anterior angles of the orbits. A black line crosses the superciliaries and the base of the frontal, joining the posterior angles of the orbits. The snout is much lighter brown than the top of the head. Upper labials yellowish, widely margined with bluish brown and dotted with dark brown. Last labial brown. Chin and throat yellowish.

Body short and stout. Tail short. This is the largest of the *Heterodontes*. I have examined specimens three feet long.

When disturbed this snake inflates its lungs, flattens its head, and opens its mouth. It rarely if ever strikes, except when it is being handled.

Found throughout the state. Specimens have been reported from Mitchell, Republic, Rooks, Barber, Lyon, Shawnee, Douglas, Franklin, Geary, Phillips, Ellsworth, Logan, Montgomery, Harvey, Osborne, Wallace, Pottawatomie and Sumner counties.

Heterodon nasicus Baird and Girard.

Spreading Viper, Texas Rooter, Hog-nosed Snake.

Heterodon nasicus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 61.

Heterodon simus nasicus, H. nasicus nasicus Cope, Check-list N. Amer. Batr. Rept., 1875, p. 43.

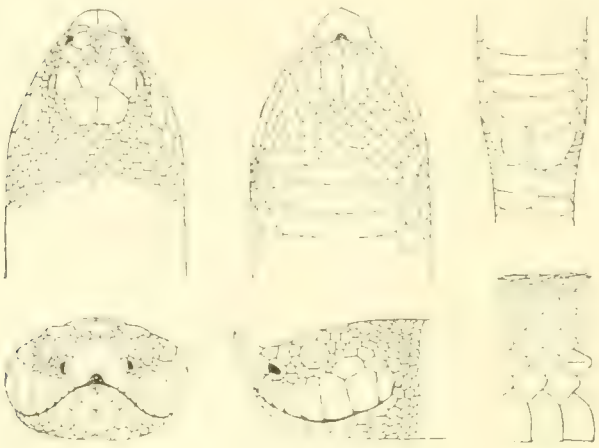

Fig. 10.
Heterodon nasicus B. and G.

Dorsal scales in twenty-three rows; outer row smooth, second row faintly keeled, all of the others strongly keeled. Frontal and parietal wider than long. Rostral broad and high, outline rounded. Azygous plate surrounded by from eight to twenty-five small scales. Two loreals on each side. Superior labials very high. Pregenials much larger than postgenials. Temporals 1–2. Orbital plates ten to twelve. Superior labials eight (occ. nine). Inferior labials ten to thirteen. Gastrosteges 150. Urosteges 32. Anal plate divided.

The following are scutellation and measurements of four specimens in the Kansas University museum:

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
27	$2\frac{5}{8}$	152	31	23
16	$1\frac{3}{8}$	151	31	23
$7\frac{1}{4}$	1	150	30	23
$7\frac{1}{2}$	$1\frac{1}{4}$	151	30	23

Color above brown; forty-five to fifty-five dorsal spots from occiput to end of tail. These spots are two scales long by ten scales wide. Alternating with them is another series of spots on each side. These are two scales long by four wide. There are four rows of spots on each side of the dorsal row. The spots in the last row are very small. They give to the sides a finely mottled appearance. The spots are dark brown. The color of the abdomen is white, maculated by a series of black spots. These cover two-thirds of the length of each gastrostege and extend over three gastrosteges antero-posteriorly. The spots corner with each other, making the series zigzag. Occasionally the abdomen is entirely black. Urosteges black. Throat white. A white band extends from the eye across the last three upper labials to the angle of the mouth. A white band extends across the superciliaries and frontal connecting the eyes. Inferior labials white. Superior labials darker above.

This snake is very gentle and it is almost impossible to induce it to bite. It is needless to say that it is not poisonous. It feeds upon birds and small mammals. A large specimen that I captured in Scott county had just swallowed a full-grown meadowlark (*Sturnella magna neglecta*). I kept one in this laboratory for six months. During that time it would not take food of any kind, and it finally died of starvation. H. A. Brous (4, II, 136) tells of a strange habit of this snake. He once found a small turtle (*Cistudo ornata*) with a Hog-nosed Snake attached to its hind foot. It took no little effort to force the snake to release its hold. As there was little blood in the limb and none had escaped from the snake's mouth, it had probably been sucking the turtle's blood. The snake had evidently been holding to the foot for some time. Mr. Brous examined many turtles after this discovery and found that the hind feet were in many cases mutilated. The front feet were not injured, because the turtles were able to defend them. Inquiry revealed that other

persons had observed the same habit. The snake probably attaches itself in order to suck the blood of its victim.

The Hog-nosed Snake occurs throughout the state. I have examined specimens from Clay, Hamilton, Rawlins, Republic, Mitchell, Ellsworth, Scott, Douglas, Logan, Lyon, Gove, Franklin, Clark and Norton counties. Specimens have been reported from Montgomery, Stanton, Logan, Morton, Neosho, Osborne and Phillips counties.

NATRIX Laurenti.

Natrix Laurenti, Spec. Syn. Rept., 1768, p. 73.

Tropidonotus Kuhl, Isis von Oken, 1826, p. 205.

Nerodia and *Regina* Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, pp. 38, 45.

Teeth longer on posterior part of maxillary bone. Head scutella normal. Oculars 2–2. Loreal 1. Nasals 2. Anal divided. Urosteges in two series. Dorsal scales in Kansas species in from 19 to 27 rows. Scales all keeled.

KEY TO KANSAS SPECIES.

I.—Body with stripes; scales in 19 rows.....*N. grahamii.*

II.—Body with spots or cross-bands; scales in 23–27 rows.

1.—Scales in 23 (occ. 25) rows. Dark brown with alternating spots. Sometimes cross-bands anteriorly.....*N. fasciata.*

2.—Scales in 27 rows. Alternating dark brown spots.....*N. rhombifera.*

Natrix grahamii Baird and Girard.

Graham's Queen Snake.

Regina grahamii Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp, 1853, p. 47.

Tropidonotus grahamii Günther, Cat. Colubr Snakes Brit. Mus., 1858, p. 78; Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 240.

Natrix grahamii Cope, Proc. U. S. Nat. Mus., XIX, 1892, p. 668.

Nineteen rows of scales; outer row smooth, all of the others strongly keeled; scales in outer row wider than long, slightly notched at the tip; scales in other rows more decidedly notched. Frontal pentagonal. Occipitals long. Parietals narrow. Prefrontals wider than long. Internasals right-triangular, with the apex slightly truncated. Nasal broad and long; nare small, situated slightly above the center of the plate. Loreal high, pentagonal. Oculars 2–2. Temporals 1–2. Anal plate divided. Upper labials seven, fifth and sixth largest. Lower labials ten, fifth largest. Postgenials much longer than pregenials. Gastrosteges 155–175. Urosteges 50–70.

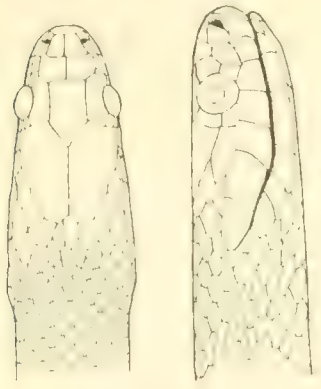

FIG. 11.
Natrix grahamii B. and G.

The following are the dimensions and scutellation of five specimens from Douglas county in the Kansas University museum:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges.	Scales.
21	4¾	163	59	19
26	..	160	..	19
10	2	170	65	19
16½	3½	171	65	19
23½	4	162	57	19

Color light brown above, with a sepia brown stripe on the three dorsal rows of scales. The first three rows of scales are cream color, darkened by many minute spots. There is a narrow black stripe on the margin between the first row of dorsal scales and the gastrosteges. In some specimens there is an interrupted stripe on the middle of the belly. Top of head dark brown to black. Temporal region black. Superior labials whitish, upper margins darker. Inferior labials, under part of head and belly cream-buff.

This snake is quite numerous in the eastern part of Kansas. None have been reported from west of Junction City. In the collections that I have examined in the middle western part of the state I have found none of them, and I think it probable that they do not occur west of the Republican river. I have examined specimens from Douglas, Shawnee, Montgomery, Lyon and Johnson counties. Cragin reports it from Woodson county.

Natrix rhombifera Hallowell.

Holbrook's Water Snake.

Tropidonotus rhombifer Hallowell, Proc. Acad. Nat. Sci. Phila., 1852 p. 177.

Nerodia holbrookii Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 43.

Tropidonotus fasciatus (var.) *rhombifer* Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 244.

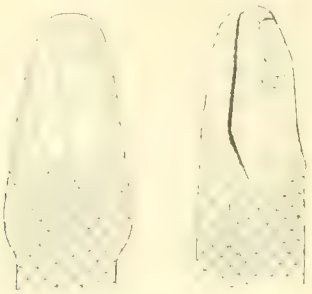

FIG. 12.
Natrix rhombifera Hal.

Dorsal scales in twenty-seven rows; first row faintly keeled, all of the others strongly keeled. Scales not notched. Frontal long, narrow, flaring anteriorly. Superciliaries narrow anteriorly, broader posteriorly. Occipitals large, outer margins irregular. Internasals small, wedge-shaped. Nasals large. Nares small, situated between the nasal plates. Loreal subtriangular. Oculars 1–3 or 1–4. Supralabials eight, fourth entering the orbit; sixth and seventh largest. Infralabials eleven (occ. twelve), sixth largest. Gastrosteges 140–150. Urosteges 55–75. Anal divided. Urosteges in two series.

Color above drab gray, below greenish yellow. Three rows of transverse black spots above; about thirty-five to anus; twenty on tail. Lateral spots alternating with dorsal. Dorsal spots seven scales wide by two long; lateral spots covering the same number of scales and extending to the inferior row. Black markings on the base of the scales connect the lateral spots with the dorsal. Gastrosteges with large, triangular black spots near the ends; two or three small spots between the larger spots on each gastrostege. The triangular spots on the urosteges are very large. Upper part of head lead color. Superior labials lighter, bordered with brown or black. Under part of head and neck yellowish white.

Head distinct from body. Body thick; sometimes attaining a length of three feet.

A female specimen captured in Douglas county early in the spring gave birth to thirteen young late in the following August. The young varied in length from 8¼ to 9½ inches. All were marked like the adult.

This snake occurs in Wyandotte, Leavenworth, Jefferson, Douglas, Miami, Linn, Franklin, Johnson and Osage counties. It has never been reported from any other part of Kansas.

Natrix fasciata Linnæus.

Water Snake, Water Moccasin.

Coluber fasciatus Linnæus, Syst. Nat., I, 1766, p. 378.

Tropidonotus fasciatus Dumeril and Bibron, Erp. Gen., VII, 1854, p. 566.

Tropidonotus sipedon Cope, Check-list N. Amer. Batr. Rept., 1875, p. 42.

Natrix fasciata Cope, Proc. U. S. Nat. Mus., XI, 1888, p. 392.

KEY TO SUBSPECIES.

1.—Ventrals spotted:
Cross-bands on whole of back.....*N. fasciata fasciata.*
Cross-bands in front; spots posteriorly.....*N. fasciata sipedon.*
2.—Ventrals not spotted; neither dorsal nor lateral spots.
N. fasciata erythrogaster.

Natrix fasciata sipedon Linnæus.

Coluber sipedon Linnæus, Syst. Nat., 10th ed., 1758, I, p. 219.

Tropidonotus sipedon Holbrook, N. Amer. Herp., III, 1842, p. 29.

Tropidonotus sipedon Cope, Check-list N. Amer. Batr. Rept., 1875, p. 42.

Tropidonotus fasciatus (var.) *sipedon* Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 244.

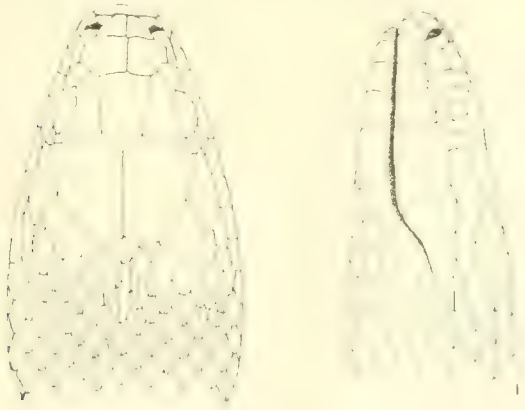

FIG. 13.
Natrix fasciata sipedon Linn.

Twenty-three rows of keeled scales, outer row as wide as long. Frontal narrow, sides concave. Superciliaries narrow in front. Occipitals broad and short. One large anteorbital, its superior angle reaching nearly to the frontal. Three postorbitals. Loreal quadrangular, higher than long. Prefrontals wider than long. Internasals wedge-shaped, longer than wide. Rostral not prominent, a small portion of it visible from above. Two nasals. Upper labials eight or nine; frequently eight on one side and nine on the other. Eye above fourth and fifth labials. Lower labials ten, fifth and sixth largest. Gastrosteges 132–150. Urosteges 55–80, in two series. Anal plate divided.

The following are the scutellation and dimensions of six specimens in Kansas University museum:

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
8½	1⅝	143	57	23
38	8¾	146	65	23
20½	5⅛	143	76	23
23½	6	140	68	23
21½	5¾	140	63	23
38	8½	142	67	23

A dorsal series of large spots, three to five scales long, separated by light interspaces of one-half to one scale. Alternating with the dorsal spots are lateral spots of the same color. These spots are one and one-half to two and one-half scales long, extending onto the gastrosteges. These are separated by lighter interspaces from two to three scales long. Anteriorly the lateral spots are often indistinct; frequently they become confluent with the dorsal spots, forming cross-bands. Belly maculated by many brown spots bordered with black. Spots more numerous posteriorly. In old specimens the general color markings are obscured and the snake appears plain brown. Top of head brown. Upper part of supralabials brownish, lower part yellowish. Chin and throat yellowish.

Found throughout the state. I have examined specimens from Douglas, Mitchell, Shawnee, Clark, Phillips, Riley, Wabaunsee, Trego, Lyon, Franklin and Republic counties. Specimens have been reported from Logan, Miami, Montgomery, Geary, Woodson, Harvey, Neosho, Greenwood and Pottawatomie counties.

Natrix fasciata erythrogaster Shaw.

Red-bellied Water Snake.

Nerodia erythrogaster Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 40.

Tropidonotus erythrogaster Holbrook, N. Amer. Herpt., 2d ed., III, 1842, p. 33.

Natrix fasciata erythrogaster Cope, Proc. U. S. Nat. Mus., XI, 1888, p. 392.

Tropidonotus fasciatus (var.) *erythrogaster* Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 245.

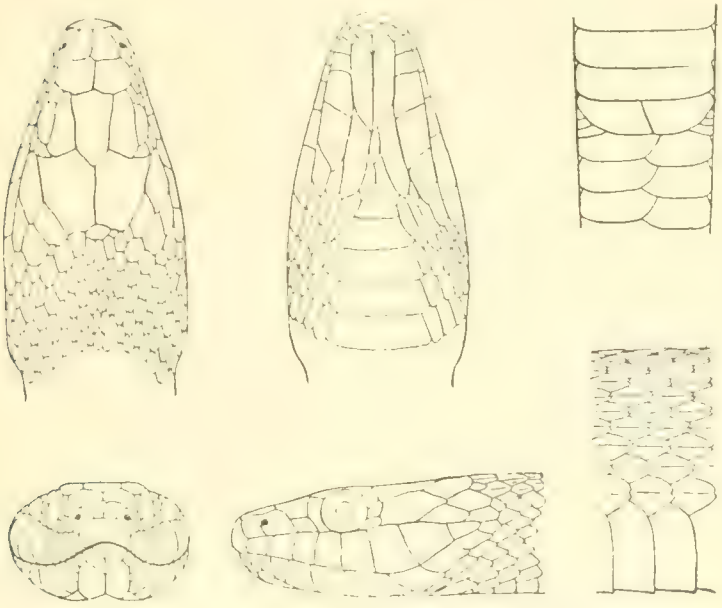

FIG. 14.

Natrix fasciata erythrogaster Shaw.

The occurrence of *N. fasciata erythrogaster* in Kansas is extremely doubtful. I have found no specimen of it in collections that I have examined. Cope (6. 43) records it from Kansas, but in his "Crocodilians, Lizards, and Snakes" he does not do so; St. Louis, Mo., and the reigon of the Colorado and Zuni survey being the nearest points mentioned. The following description is taken from Cope (10. 975):

Head elongated, narrowing forward. Gastrosteges most numerous of all the subspecies of the *Natrix sipedon*. Three postorbitals. An elevated loreal. Dorsal rows of scales, twenty-three, sometimes twenty-five, all very strongly carinated. Uniform dark bluish black above, lighter on sides; lateral or ex-

ternal band of dull blue extending on the abdominal scutellæ. Body beneath (in alcohol) uniform dull yellow, tail bluish.

The head is proportionally narrow and elongated, flattened above and convex on the snout. The frontal plate is elongated and subpentagonal, broader anteriorly than posteriorly, with the sides slightly concave. The postorbital plates proportionally small are three in number. Loreal large and polygonal, higher than long. There are three or four temporal shields very much developed, but one in contact with postorbitals. Dorsal rows of scales twenty-three or twenty-four in number, strongly carinated with the keels on the posterior third of the body, constituting very conspicuous and continuous ridges, the immediate depressions or furrows giving to the body and tail a canaliculated appearance. The lateral or outer row, however, is but slightly carinated. The tail itself is subconical, very much tapering, forming one-fourth of the entire length.

COLUBER Linnæus.

Coluber Linnæus, Syst. Nat., 10th ed., p. 216 (1758).

Calopeltis Bonaparte, Mem. Real. Acad., Torino II, 1840, p. 431.

Scotophis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 73.

Natrix Cope from Laurenti, Proc. Acad. Nat. Sci. Phila., 1862, p. 338.

Scales in 19–35 rows; more or less keeled. Loreal one. Two nasals. One preocular. Anal divided. Maxillary teeth equal. Head distinct.

KEY TO KANSAS SPECIES.

One or two plates in the first row of temporals.

About nine rows of indistinctly keeled scales. Scales in 25–29 rows. Brown spots above. ..... *C. spiloides.*

Keeled rows 13–21. Black above or with red or yellowish between large spots. *C. obsoletus.*

Keeled rows 9–11. Scales in 25–27 rows. Yellow, with distinct rounded dark spots ..... *C. vulpinus.*

Three plates in the first row of temporals. Seven to thirteen rows of keeled scales. Light gray with brown spots ..... *C. emoryi.*

Coluber spiloides Dumeril and Bibron.

Red-headed Coluber.

Coluber spiloides Dumeril and Bibron, Erp. Gen., VII, 1854, p. 269.

Coluber obsoletus confinis Cope, Check-list N. Amer. Batr. Rept., 1875, p. 39

Coluber obsoletus Boulenger, part, Cat. Snakes Brit. Mus., II, 1894, p. 50.

Scales in twenty-seven rows; 5–11 rows very faintly keeled Occipitals long, broad anteriorly. Superciliaries twice as wide

posteriorly as anteriorly. Prefrontals long and broad. Internasals small. Rostral broad. Loreal slender, pointed posteriorly. Oculars 1–2. Temporals 2–3. Upper labials eight. Lower labials eleven, sixth largest. Pregenials much larger than postgenials. Gastrosteges 238. Urosteges 78.

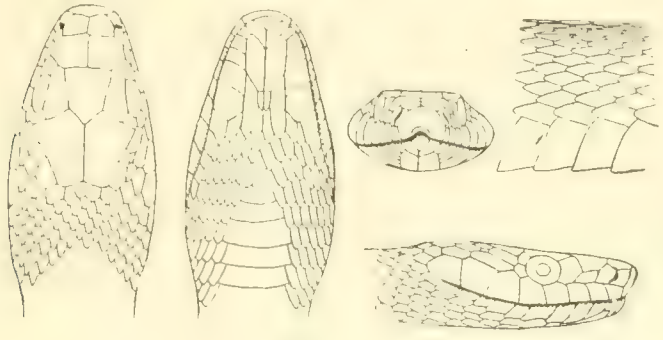

Fig. 15.
Coluber spiloides D. and B.

Color above ash-gray. A dorsal series of about forty-five spots; anterior spots about thirteen scales wide by six long; posterior slightly shorter. Most of the spots rhomboidal. Alternating with the dorsal spots is a series of elongated lateral spots of the same color as the dorsal. Anteriorly two or three of these spots may coalesce, forming a narrow stripe. On the margin of the gastrosteges is a series of small, square brown spots. Belly whitish with black blotches. Chin and throat white. Four or five lower labials with black blotches. A black stripe from the orbit to the angle of the mouth. A black stripe crossing labials below the eye. Top of head brown. A black stripe crossing base of prefrontals and connecting the orbits.

Head distinct from body. Body moderately thick. Tail short and slender. Length three feet.

One specimen from Douglas county is in the University museum. A specimen from Douglas county, identified by Cope in 1878 as *C. obsoletus confinis*, agrees exactly with his 1898 description of *spiloides*. Cope's *C. confinis* seems to be a doubtful species, as it is based upon only two specimens, and he was unable to find the type specimens of Baird and Girard (10. 830). Brown (5 : 49) includes Cope's *C. confinis* and *C. spiloides* under *C. ob-*

soletus confinis. From the small number of specimens that I have at my disposal I cannot form an opinion as to which is right. However, the Kansas specimens all belong to one species, and they agree more nearly with *C. spiloides* as described by Cope (10. 841) than with any other species.

Coluber obsoletus Say.

Coluber obsoletus Say, in Long's Exped. Rocky Mts., I, 1823, p. 140.

Coluber allegheniensis Holbrook, N. Amer. Herpt., I, 1836, p. 111.

Scotophis allegheniensis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 73.

Scotophis obsoletus Kennicott, Proc. Acad. Nat. Sci. Phila., 1860, p. 330.

Cope (10. 844) gives two subspecies. Only one of these—*C. obsoletus obsoletus*—occurs in Kansas.

Coluber obsoletus obsoletus Say.

Mountain Black Snake or Pilot Snake.

Twenty-seven or twenty-five rows of dorsal scales; about fifteen rows keeled. Frontal regularly pentagonal. Superciliaries broad posteriorly, narrow anteriorly. Prefrontals large. Internasals moderate, quadrate. Loreal small, trapezoidal. Rostral large, slightly rounded above. Pregenials larger than postgenials. Upper labials eight or nine, sixth and seventh largest; fourth and fifth entering the orbit. Lower labials eleven or twelve, sixth or seventh largest.

The following are the dimensions and scutellation of ten specimens from Douglas county:

Length, in.	Tail, in.	Urosteges.	Gastrosteges.	Scales.
21¾	3½	75	227	27
35¼	6¼	87	232	27
50	...	..	225	27
51	8	72	237	27
42	6¼	..	226	27
60	10	74	238	27
60¼	9¾	82	227	25
50¼	9¼	84	224	25
58	10	84	232	27
48	8½	79	227	27

Color above black. Dorsal spots indistinctly outlined. When the spots are distinguishable the narrow interspaces are red. Dorsal spots large, quadrangular; thirty to forty from head to anus. Alternating with them are smaller elongated

blotches. On the margin of the gastrosteges is a series of smaller spots alternating with the lateral series. Belly blackish posteriorly, yellow anteriorly. Many black blotches on the anterior half. Chin and throat white. Top of head brownish. Upper labials yellowish, margined with black. The young are much lighter colored than the adult and are distinctly spotted.

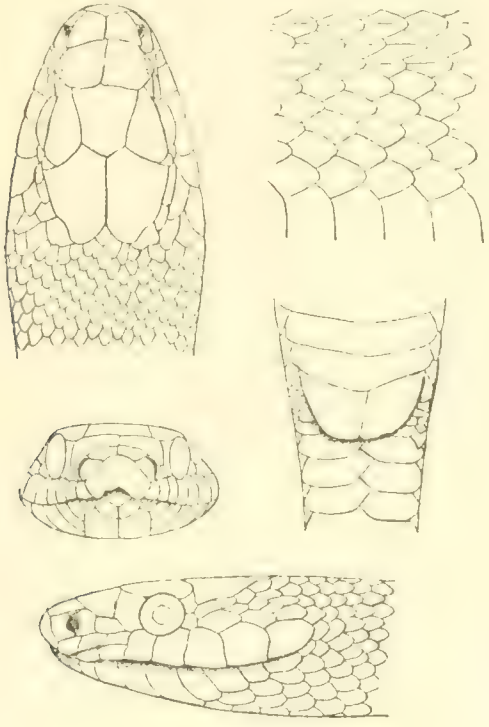

FIG. 16.
Coluber obsoletus obsoletus Say.

Cope says of this snake: "It is of an inoffensive disposition and may be handled with impunity." The Kansas Black Snake is a fighter. One that I had in this laboratory last summer struck the wires of his cage furiously whenever any one approached him. I kept him for six months, and although he became gentler, whenever I handled him I had to grasp him firmly by the neck to keep him from biting. I have made observations on several of these snakes in captivity and all of them behaved in much the same way as the one mentioned above. When excited the Black Snake vibrates its tail rapidly,

making a whirring sound. If it be among dry leaves or sand, the noise resembles the whir of a rattler.

The snake mentioned above ate nothing during its captivity. Mice, birds, eggs, toads, etc., were placed in the cage with it, but it paid no attention to them. In their wild state these snakes live upon birds, birds' eggs, and vermin of various kinds. They destroy more birds' eggs than any other snakes found in Kansas. They climb among the branches of trees in search of them, and, if they are fortunate enough to find so many, a single individual will devour ten or twelve eggs, as large as those of a quail, in one day. Professor Hay (16. 118) states that he took eight mice, six of them young, from the stomach of an individual four feet four inches in length. One, five feet long, brought to this laboratory this spring, had three young rabbits as large as rats in its stomach.

Doctor Stejneger (16. 119) states that the Black Snake is oviparous. Several snake eggs taken from a stump near the Potomac river were opened at the National Museum and found to contain developed young of this species.

A specimen that I had in this laboratory molted three times during six months of captivity. For four or five days before molting it was sick. It was entirely blind during the same time. It was very sluggish and struggled little when handled.

Occurs throughout the eastern part of the state, but probably not west of the Republican river. It has been reported from Doniphan, Brown, Nemaha, Pottawatomie, Geary, Jefferson, Shawnee, Montgomery, Miami, Neosho, Greenwood, Sumner, Douglas, Riley, Wyandotte, Lyon and Franklin counties.

Coluber vulpinus Baird and Girard.

Fox Snake.

Scotophis vulpinus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 75.

Coluber vulpinus Cope, Check-list N. Amer. Batr. Rept., 1875, p. 39.

Internasals much smaller than prefrontals. Rostral broad. Parietals broad, rather short, longer than the frontal, shorter than the muzzle anterior to the frontal plate. Eyes center over the junction of the fourth and fifth labials. Upper labials eight, seventh one of the largest. Anteriorly the first three or four rows of scales are smooth, then they are obsoletely cari-

nated, then more so toward the back, although everywhere moderately so. Gastrosteges and urosteges less numerous than in the other American species.

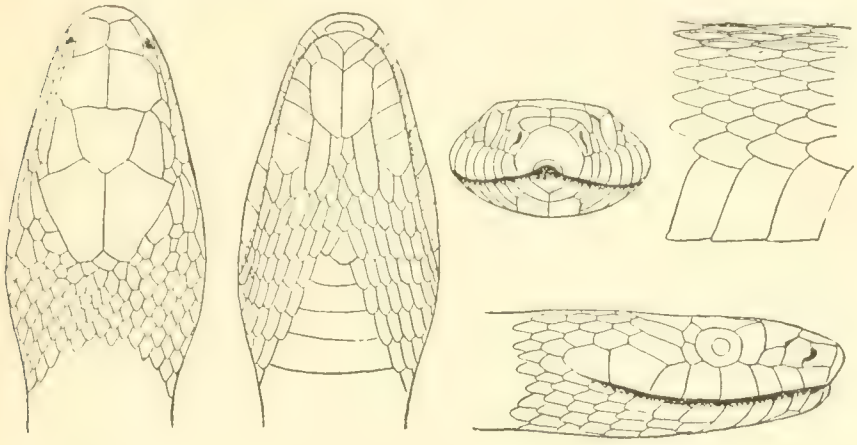

FIG. 17.
Coluber vulpinus B. and G.

Ground color above light brown. A series of broad transverse, quadrate, chocolate blotches extending from head to tail, about sixty in number; forty-four to anus. The first spot anteriorly is divided into two on the nape, and occasionally the blotches are irregular, oblique, and varying in size. This occurs, however, only on the anterior fifth of the body, behind which the intervals between the blotches are rectilinear, nearly equal, and about one and a half scales in length. The blotches are generally embraced between the fifth or sixth rows on each side, and are three to four scales long. The sides of the blotches are not linear, but obtuse-angled. On each side is a series of smaller rounded blotches, on the third to seventh rows, similar in color to those on the back, and, like them, with a black border, sometimes more or less interrupted. Another series of subquadrate blotches, about the same as the last, is visible on the edge of the abdomen, sometimes involving the first and second rows of scales; these are opposite to the dorsal blotches. Rest of the abdomen yellowish white, with alternating quadrate blotches of black. The brown color becomes lighter on the sides.

This is the most robust species of the genus, and it reaches

as large a size as any. Every character is consistent. The head is short, the parietal plates are short, the body is short, the tail is short, and the spots are short relatively to the other species of the genus.

(Description from Cope's "Crocodilians, Lizards, and Snakes," p. 831.)

This species is listed on the authority of Cope and Cragin, but their statements are not definite. In a letter to me, dated May 20, 1903, Professor Cragin says: "I think I have myself collected this species (*C. vulpinus*) in Kansas, and have identified a specimen that Professor Popenoe collected. But I can no longer remember the localities, and I may be mistaken in my impression." Cragin, in his list of Kansas reptiles of 1880, gives this species on the authority of Cope. In his check-list of 1875, Cope gives the range of *C. vulpinus* as "Massachusetts to Michigan, Kansas and northward," but in his "Crocodilians, Lizards, and Snakes," Webster City, Iowa, is the most westerly locality given. It is probable that *C. vulpinus* occurs in Kansas, but with the present evidence I list it as doubtful.

Coluber emoryi Baird and Girard.

Emory's Snake.

Scotophis emoryi Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 157.

Coluber emoryi Cope, Check-list N. Amer. Batr. Rept., 1875, p. 39.

Coluber guttatus Boulenger, part, Cat. Snakes Brit. Mus., 1894, p. 39.

Three well-developed scales in the first row of temporals. Frontal plate more elongated than in the species of allied color, being decidedly longer than broad. Head rather narrow. Eye large, its center a little posterior to the junction of the fourth and fifth labials. Postorbitals resting on the fifth labial. Anteorbital large. Loreal elongated, acute-angled behind. Upper labials eight, sixth and seventh largest. Lower labials eleven, sixth largest. Dorsal rows of scales 27–29; smooth, except traces on central five or six in a few individuals. Exterior row largest, rest nearly equal.

Ground color grayish ash. A series of olivaceous brown, transverse, quadrate blotches along the back as high as seventy in number, from thirty-five to fifty anterior to the anus. These are ten or twelve scales broad, two or three long, and separated

by intervals of one or two scales. They are narrowly margined with black. On each side of the dorsal series, and alternating with it, is a series of smaller, nearly circular, but similarly constituted blotches extending between the third and seventh or eighth rows. Below this, and on the second and third rows, is a still smaller and quite distinct third series, and occasionally traces of a fourth on the first and second. The ground color or space between the blotches is grayish ash; each scale minutely mottled with dark brown or black; the extreme border generally pure ash, especially on the sides. Beneath yellowish white, with rather indistinct blotches of brownish ash, thickest behind.

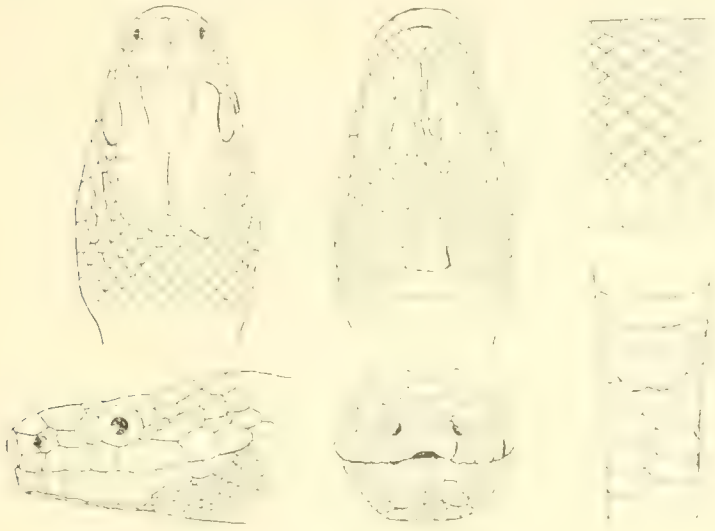

FIG. 18.
Coluber emoryi B. and G.

Head grayish ash, with a somewhat curved, broad, brown vitta on the back part of the postfrontals, which, involving the commissure of the anteorbital and superciliary, passes back through the eye, and, crossing the angle of the mouth on the adjacent halves of the ultimate and penultimate labials, extends into the blotches on the sides of the neck. A second nearly effaced bar crosses the anterior frontals, leaving an ash-colored band half the width of the first-mentioned bar. The anterior dorsal blotch is replaced by two elongated ones running up on the head to the center of the occipitals, parallel with the post-

ocular vitta, with an ash-colored stripe between the two, which extends from the superciliary backward on the sides of the neck. As in the other brown marks these stripes are margined with black. The adjacent edges of the fourth and fifth labials are brown.

(Description from Cope's "Crocodilians, Lizards, and Snakes," pp. 852–854.)

I have examined specimens from Riley and Phillips counties. It probably occurs throughout the state, but is very rare.

STORERIA Baird and Girard.

Storeria Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 135.

Ischnognathus Dumeril, Prod. des Ophid., 1853, p. 72.

KEY TO SPECIES.

Dorsal scales carinated, fifteen to seventeen rows. Cephalic plates normal. Anal divided. Subcaudals in two series. Head distinct from body. Dorsal scales in fifteen rows; oculars 2-2; five or six upper labials. *S. occipitomaculata.*

Dorsal scales in seventeen rows; oculars 1-2; seven upper labials.. *S. dekayi.*

Storeria occipitomaculata Baird and Girard.

Storer's Snake.

Tropidonotus occipitomaculatus Storer, Rep. Rept. Mass., 1830, p. 230.

Storeria occipitomaculata Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 137.

Ischnognathus occipitomaculatus Gunther, Cat. Colubr., Snakes Brit. Mus., 1858, p. 61.

FIG. 19.
Storeria occipitomaculata B. and G.

Dorsal scales all keeled, in fifteen rows. Frontal broad, hexagonal. Superciliaries narrow, about the same width posteriorly as anteriorly. Occipitals large. Prefrontals quadrangular, broad, and short. Internasals with the posterior and inner margins straight, the outer margin curved. Rostral broad, of medium height. Nasals large, nostril in anterior.

Posterior nasal in contact with preocular. Oculars 2–2. Temporals 1–1. The first temporal extends for half the length of the sixth labial. Upper labials six; first, fifth and sixth longer than high. Eye above third and fourth labials. Lower labials seven, fourth and fifth largest. Pregenials longer than postgenials. First gastrostege not divided. Gastrosteges 120–140. Urosteges 40–60.

Length about twenty inches; tail about three inches. Body slender.

Color above, olive or chestnut brown, uniform or with a lighter dorsal stripe three inches in width. A stripe of the same color on the outer row of scales. On each side of the dorsal stripe two rows of minute brown spots are sometimes present. These spots are on the bases of the scales of the third row from the dorsal. Belly in alcoholic specimen whitish yellow to greenish. The ends of the gastrosteges are often very finely spotted with brown. Just behind the occipitals is a salmon-colored blotch. Immediately behind the angle of the mouth is another blotch of the same color. The top of the head is brownish or grayish. The under part of the head is greenish or yellowish.

This snake is rare in Kansas. I have examined specimens from Bourbon, Riley and Douglas counties. Smith (21. 698) states that they are somewhat nocturnal and live chiefly under rocks and stones. They live upon grasshoppers, crickets, etc. Hay (16. 498) states that he found a slug in the stomach of one specimen.

Storeria dekayi Holbrook.

De Kay's Snake.

Tropidonotus dekayi Holbrook, N. Amer. Herp., III, 1842, p. 53.

Storeria dekayi Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 135.

Ischnognathus dekayi Dumeril and Bibron, Erp. Gen., VII, 1854, p. 507.

Dorsal rows of scales seventeen, all keeled; frontal hexagonal, longer and narrower than in *S. occipitomaculata*. Superciliaries narrow, slightly broader posteriorly. Prefrontals with anterior and inner margins straight, outer margin curved. Rostral narrower than in the preceding species. Two large nasals; nostril in anterior; posterior in contact with preocular. Oculars 1–2. Temporals 1–1; first temporal large, pointed posteriorly. Up-

per labials seven, first, second and third higher than long; eye above the fourth. Lower labials seven, fourth and fifth largest. Postgenials as long as pregenials. First gastrostege undivided. Gastrosteges 120–140. Urosteges 40–60. Anal divided.

Fig. 20.
Storeria dekayi Holb.

A thicker snake than *S. occipitomaculata*. Its diameter is much the greatest in the middle. Length about fifteen inches. Eyes and head small. Color above grayish to chestnut brown. A light dorsal stripe extends from the head to the end of the tail. This stripe is bordered on each edge by a series of brown spots. These spots are formed from brown on the inner side of the bases of two scales and the brown tip of the scale joining the two. Alternating with these is another series of spots formed in the same way. These spots occur at intervals of two scales. Alternating with the second series of spots is a third series. These are very small, covering only the upper side of the base of every third scale of the inferior row. There is a black dot near the end of each gastrostege of some specimens. Generally these spots are somewhat obscure. The first spot of the superior row is very much enlarged and joins the first spot of the second row. In a specimen now before me the first eight spots of the first and second rows coalesce. Head brown above. One or more small black bars across the temporals. Posterior margins of the third and fourth superior labials black. Frequently the posterior margins of some of the other labials are black. Under part of head whitish. Infralabials sometimes margined with black.

Several specimens from Douglas county are in the Kansas University museum. I have examined specimens from Wabaunsee and Wyandotte counties. It occurs throughout the eastern part of the state. Cope (10. 1002) states that it is en-

tirely terrestrial in its habits. Smith (21. 697) states that it is aquatic. All the specimens in the Kansas University museum were taken either in water or in the vicinity of water. Hay (16. 497) states that it is ovoviparous, but the evidence that he gives is not conclusive.

OPHIBOLUS Baird and Girard.

Lampropeltis Fitzinger, Syst. Rept., 1843, p. 25.

Ophibolus Baird and Girard, Cat. N. Amer. Rep., Pt. I, Serp., 1853, p. 82.

Scales in 19–25 rows, smooth with two apical pits. Loreal present. One preocular. Two nasals. Anal entire. Maxillary teeth slightly longer posteriorly. Head little distinct.

KEY TO KANSAS SPECIES.

I.—Scales in 25 rows; color brown; a median dorsal and two lateral rows of spots ..... *O. calligaster.*

II.—Scales in 21–23 rows: color black, with small white or yellow blotch in the center of each scale..... *O. getulus.*

III.—Scales in 21 rows; rings around the body, or body spotted with brown. *O. doliatus.*

Ophibolus calligaster Say.

Evans's King Snake.

Coluber calligaster Say, Harlan's Med. and Phys. Res., 1835, p. 122.

Coluber guttatus Schlegel, Ess. Phys. Serp., II, 1837, p. 108.

Ophibolus evansii Kennicott, Proc. Acad. Nat. Sci. Phila., 1859, p. 99.

Lampropeltis calligaster Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 225.

Ophibolus calligaster Cope, Check-list N. Amer. Batr. Rept., 1875, p. 37.

Cornella calligaster Boulenger, Cat. Snakes Brit. Mus., II, 1894, p. 198.

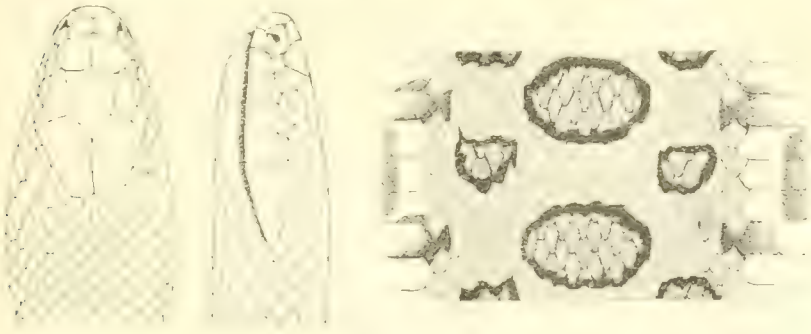

Fig. 21.
Ophibolus calligaster Say.

Dorsal scales smooth, thin, in twenty-four rows. Outer row widest. Frontal as long as rest of muzzle. Two nasals. Loreal quadrate. Oculars 1–2. Temporals 2–, 2–3. Upper labials

seven, rarely eight, sixth largest; third and fourth entering orbit. Lower labials nine, occasionally ten, fifth largest; first pair meeting at the median line. Pregenials larger than postgenials. Gastrosteges 198–215. Urosteges 44–57, in two series. Anal entire. Tail about one-seventh total length.

Ground color above hair brown. A dorsal series of about fifty-five subquadrate spots eleven scales wide by two and one-half scales long. Alternating with the dorsal spots are lateral spots four scales wide by one and one-half scales long. These are on the second to seventh rows of scales. A series of smaller spots, partly on the gastrosteges and partly on the first row of scales, alternates with the lateral. The spots are seal brown bordered with black. Belly pearly white maculated with a double row of slate-gray spots. Each spot covers the ends of two or three gastrosteges. Labials bordered with black. Two parallel bars on the occipitals terminated by a brown spot on the frontal. A brown band from the angle of the eye to the angle of the mouth crosses the upper part of the last three upper labials. In old specimens the head markings become indistinct.

Scutellation and dimensions of six specimens from Douglas county:

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
40	7	204	54	25
37½	..	215	43	25
35	5	197	52	25
46	6½	201	50	25
39	5	206	47	25
37	5	198	49	25

This species is quite numerous throughout the eastern part of Kansas, and occurs in all parts of the state. In the collection of snakes at the Beloit high school there are eight specimens of *Ophibolus calligaster* and not more than seven of any other species. This collection is representative of Mitchell county, and indicates that *O. calligaster* is as numerous as any other species found there. I have examined specimens from Douglas, Mitchell, Jefferson, Lyon, Franklin, Republic, Shawnee, Scott, Gove, Logan and Riley counties. It has been reported from Geary, Sumner, Miami, Neosho, Pottawatomie and Greenwood counties.

O. calligaster lives upon mice, frogs, small fish, etc. I kept

three specimens in this laboratory last summer. Birds, toads, lizards, mice, insects and smaller snakes were placed in the cage with them. They paid no attention to the birds, toads, lizards, and insects, but attacked the mice as soon as they saw them. They would attempt to swallow dead mice that were placed in the cage, but always seized them by the middle of of the body. They could not swallow them without beginning at the head, and eventually gave it up. I captured a specimen in Gove county in August, 1893, that had just swallowed a mouse. From these observations I conclude that mice are its principal food.

This snake is not often found far from water. The ones that I kept in captivity last summer stayed in the water most of the time. One of these snakes molted three, one four and one two times during their five months' captivity. The one that molted four times always became cross just before molting and would strike at me when I attempted to handle him. He did not strike hard enough to do any injury.

OPHIBOLUS Baird and Girard.

Coluber getulus Linnæus, Syst. Nat., I, 1766, p. 382.

Ophibolus getulus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 85.

Lampropeltis getulus, Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 225. Cope divides this species into five subspecies, only one of which, *Ophibolus getulus sayi*, occurs in Kansas.

Ophibolus gentulus sayi Holbrook.

Say's King Snake, Chicken Snake, Guinea Snake.

Cornella sayi Holbrook, N. Amer. Herp., III, 1842, p. 99.

Ophibolus sayi Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 84.

Ophibolus getulus sayi Cope, Check-list N. Amer. Batr. Rept., 1875, p. 7.

Dorsal scales smooth, in twenty-one rows. Occipitals large, irregularly pentagonal. Frontal long, pentagonal. Superciliaries narrow, shorter than the frontals. Prefrontals large, triangular, wider than long. Rostral triangular, little visible from above. Internasals medium, quadrate. Loreal small. Two quadrate nasals. Oculars 1–2. Upper labials seven, fifth and sixth largest. Lower labials nine, fourth and fifth largest. Pregenials larger than postgenials. Gastrosteges 200–220. Urosteges 40–60. Anal plate entire.

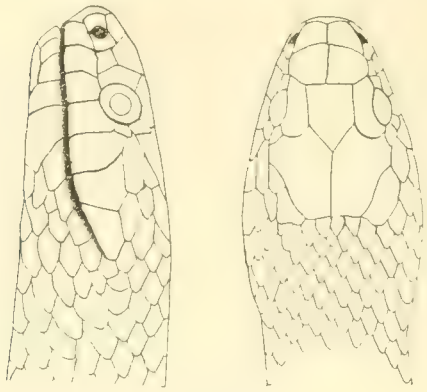

FIG. 22.
Ophibolus getulus sayi Holb.

Dorsal scales black, each with a basal or central spot of pearly white or yellow. On the sides the spots occupy more than half of the scale. In young specimens the spots are aggregated on adjacent scales and from cross-bands. This marking often persists in the adult snake. Beneath yellowish white with large black blotches, smaller and more numerous posteriorly. Upper labials yellow, black at their junction. Each plate on the sides and top of the head has a white or yellow spot. Rostral yellowish with a black border at the top.

Ophibolus getulus sayi is called King Snake because of its aggressiveness. It is an enemy of all other snakes. It attacks and swallows Rattlesnakes and Copperheads. One kept in one of the laboratories at Kansas University attacked and partially swallowed a Garter Snake nearly as large as itself. The snakes were killed in this position and are preserved in the University museum. The King Snake may be handled with perfect safety. It seldom if ever bites and it shows no fear.

It occurs throughout the state but is not numerous anywhere. It has been reported from Mitchell, Republic, Montgomery, Miami, Greenwood, Pottawatomie, Franklin, Lyon, Shawnee, Sumner, Riley, Scott, Logan and Gove counties.

Ophibolus doliatus Linnæus.

Milk Snake, House Snake, Chicken Snake.

Coluber doliatus Linnæus, Syst. Nat., I, 1776, p. 379.

Osceola doliata Cope, Trans. Amer. Phil. Soc., 1895, p. 215.

Scales in twenty-one rows, occasionally twenty-three or nine-

teen. Loreal small. Temporals 2–2, rarely 1–2 or 2–3. Oculars 1–2. Pregenials much longer than postgenials. Tail short. Head little distinct.

This species is very variable. It ranges from a spotted brown snake to a snake with black and bright scarlet rings. Cope (10. 883) distinguishes twelve varieties. In his classification he has made many arbitrary distinctions. In some instances the coloration of the anterior part of the body of specimens that I have examined agrees with one of Cope's varieties, and that of the posterior agrees with another. Occurs throughout the state, but is less numerous than formerly.

KEY TO KANSAS SUBSPECIES.

I.—An oblique yellow band behind eye..... *O. doliatus triangulus.*

II.—No oblique band behind eye.

a. Dorsal bands closed on or above the gastrosteges. *O. doliatus doliatus.*

b. Dorsal spots connected by a longitudinal black band. Black borders of dorsal spots forming rings around the body.... *O. doliatus gentilis.*

Ophibolus doliatus triangulus Cope.

Ophibolus eximus Baird and Girard, Cat. N. Amer. Rept., 1858, Pt. I, Serp., p. 87.

Ophibolus doliatus triangulus Cope, Check-list N. Amer. Batr. Rept., 1875, p. 37.

Osceola doliata triangula Cope, Rept. Nat. Mus., p. 885.

Cornella triangulum Boulenger, Cat. Snakes Brit. Mus., II, 1894, p. 200.

FIG. 23.
Ophibolus doliatus triangulus Cope.

Scales smooth, in twenty-one rows; longer than is common in these species. Frontal shield-shaped. Occipitals broad, truncate. Superciliaries larger than in the other subspecies. Prefrontals large, pentagonal, wider than long. Internasals

wider than long. Rostral low, broad. Loreal long, narrow. Upper labials seven, sixth largest; third and fourth entering orbit. Lower labials nine, fifth largest. Pregenials much larger than postgenials. Gastrosteges about 200. Urosteges about 50. Anal entire.

Color above gray. Dorsal spots about four scales long, reaching to the third or fourth row of scales from the ventrals. Spots grayish brown with broad black borders. About fifty from head to tip of tail. Alternating with the dorsal spots are black spots with brown centers. These spots are one and one-half to two scales long by four scales wide. They are on the first or second to fifth rows of scales. Alternating with these spots is another series similar in shape and size but entirely black. They are on the margin of the gastrosteges and the continuous rows of scales. Occasionally the two lateral rows become confluent. Posteriorly the belly is maculated with many black spots. The spot on the nape is elongated and reaches to the frontal. The center is a triangular spot which touches the tips of the occipitals. A black line from the eye to the angle of the mouth. This line forms the lower border of a yellowish band which reaches above the eye. A black or brownish line extends across the base of the prefrontals. Upper labials margined with black. Lower labials yellowish, bordered with black. Chin and throat yellow.

This snake is very rare in Kansas. I have examined two specimens, one from Douglas and one from Franklin county.

Ophibolus doliatus doliatus Linnæus.

Ring Snake.

Coluber doliatus Linnæus, Syst. Nat., I, 1776, p. 379.

Cornella doliata Holbrook, N. Amer. Herp., III, 1842, p. 105.

Ophibolus doliatus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 89.

Osceola doliata doliata and *O. doliata syspila* Cope, Proc. U. S. Nat. Mus. XI, 1888, p. 384.

Scales smooth, in twenty-one rows. Loreal large, quadrate. Internasals small, broader than long. Prefrontals large, quadrate. Frontal broad, pentagonal. Occipitals large, irregular in shape. Two nasals—anterior quadrate, posterior pentagonal. One preorbital. Two postorbitals—upper rectangular, lower smaller, irregular in shape. Seven upper labials, sixth

largest; third and fourth entering orbit. Ten lower labials, fifth largest. Pregenials longer than postgenials. Anal plate entire. Gastrosteges in type specimen 204. Urosteges in two series—48 in each series.

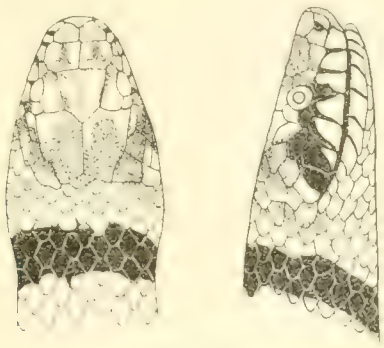

Fig. 24.
Ophibolus doliatus doliatus Linn.

The following are the dimensions and scutella of eight specimens from Douglas county:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges.	Scales.
29	$3\frac{3}{4}$	202	47	21
28	$3\frac{3}{4}$	204	49	21
$28\frac{3}{4}$	$3\frac{3}{4}$	203	46	21
$45\frac{3}{4}$	$6\frac{1}{4}$	204	51	21
28	$3\frac{1}{2}$	205	44	21
28	$3\frac{5}{8}$	212	46	21
27	$3\frac{5}{8}$	209	44	21
24	$3\frac{1}{2}$	208	52	21

Body scarlet, banded with brown, with from twenty to twenty-eight pairs of black rings, each pair enclosing a white ring. The posterior ring of each pair is continued with the anterior ring of the next pair by a black line on the gastrosteges or inferior rows of scales. The middle of the belly is maculated by a series of square black spots which alternate with the lines closing the dorsal saddles.

Rather rare, but occurs in all parts of the state. I have examined specimens from Mitchell, Riley, Republic, Shawnee, Franklin, Lyon and Douglas counties.

These snakes are very gentle. They never bite unless very much aggravated. When they do bite they do not strike like

other snakes, but take the offending object in their mouths and shut down on it. Their teeth are so small that they can do little injury.

Ophibolus doliatus gentilis Baird and Girard.

Arkansas King Snake.

Ophibolus gentilis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 90.

Oscola doliata gentilis Cope, Rep. Nat. Mus., p. 894.

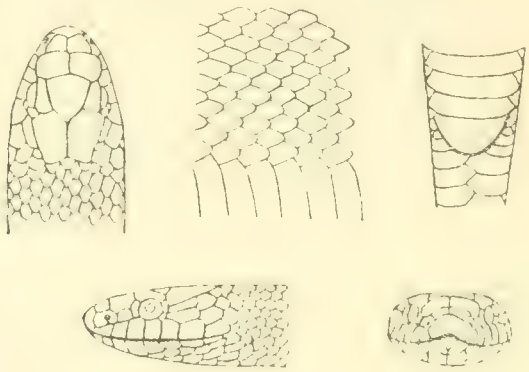

FIG 25.
Ophibolus doliatus gentilis B. and G.

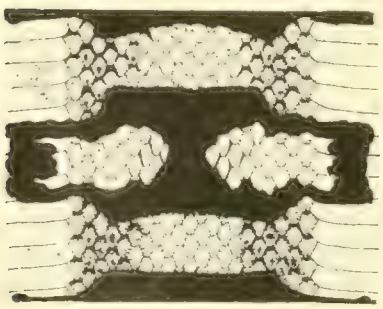

FIG. 25*a*.
Ophibolus doliatus gentilis B. and G.

Scales smooth, in twenty-one rows. Frontal with the three margins convex, pointed behind. Superciliaries small. Occipitals broad, truncate. Prefrontals short, broad. Internasals short and very wide. Rostral prominent. Loreal narrow, long. Two nasals; nostril opening mostly in anterior. Oculars 1–2. Temporals 2–2 or 2–3. Seven upper labials, fifth

and sixth largest. Nine lower labials, fifth largest. Pregenials slightly longer than postgenials. Anal entire. Gastrosteges 202. Urosteges 45, in two series.

Ground color above scarlet, encircled by twenty to thirty pairs of black rings. Each pair of black rings encloses a yellow ring. The black rings are broader above. The contiguous rings of the adjacent black rings become confluent on the back. Often the color between the rings is homogenous. Larger specimens are usually darker than smaller ones. This fusing of rings of adjacent pairs does not always occur. On the same snake there are frequently rings that show no indications of fusing and others that become almost completely fused. The scales in the yellow rings are frequently marked with black. The black rings usually extend around the body. The spaces on the belly between the adjacent pairs of rings are blackish. Top of head black to muzzle. Muzzle bright red. Each of the red plates has a black spot. The posterior parts of the occipitals are usually yellow. Postorbitals black. Labials yellowish, sometimes two or three bordered with black. Temporals margined with brown or black.

Only one specimen is known from Kansas and it is in Kansas University museum. It was collected by Professor Snow in Wallace county. Its dimensions and scutellation are as follows: Length $25\frac{5}{16}$ inches, tail $3\frac{1}{2}$ inches; gastrosteges 202; urosteges 45; scales in twenty-one rows.

RHINOCHILUS Baird and Girard.

Rhinochilus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 120; Cope, Check-list N. Amer. Batr. Rept., 1875, p. 36.

Head subelliptical, pointed at the snout, and separated from the body by a slightly contracted neck. Rostral plate large, overhanging, but not recurved above. Two pairs of frontal plates. Two nasals; nostrils intermediate. One loreal. One anterior orbital. Superciliaries large. Scales smooth. Postabdominal scutellum entire. Subcaudal scutella usually all undivided.

Only one species of this genus occurs in Kansas, and only three specimens of that species have been reported.

Rhinochilus lecontei Baird and Girard.

Le Conte's Snake.

Rhinochilus lecontei Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 120; Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 304; Boulenger, Cat. Snakes Brit. Mus., II, 1894, p. 212.

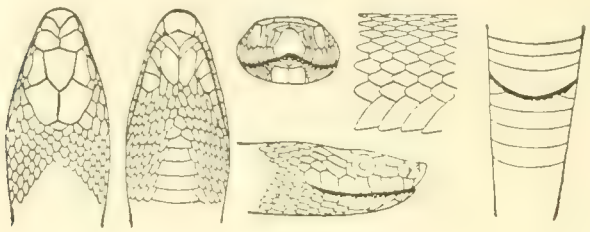

Fig. 26.
Rhinochilus lecontei B. and G.

Parietals about as wide as long. Frontal short, broad anteriorly, with lateral margins concave. Superciliaries narrow in front, broad behind. Prefrontals hexagonal, broader than long. Internasals broad, pointed at the median line. Rostral large, projecting, extending far between internasals. Two nasals, nostril between them. One preocular, above fourth labial. Two postoculars, the inferior edge of the lower in a notch between the fifth and sixth labials. Temporals 2–3. Upper labials eight, sixth and seventh largest. Lower labials eight or nine, fifth largest. Scales smooth, in twenty-one to twenty-three rows. Two pairs of genials, posterior pair very small. Anal entire. Gastrosteges in one series; occasionally two series near the tip of the tail. Gastrosteges 190–212. Urosteges 40–55.

About thirty quadrate black blotches on the body, twelve on the tail. Brick red between the blotches for six or seven rows of scales on the back. The lateral scales of the black spots have white or yellowish centers. The lateral scales between the black spots have black centers. Belly white or yellowish. Every fourth or fifth gastrostege has a black spot at the end. Head, in front of the eyes, reddish brown. Top of head black, each plate maculated with yellowish or reddish spots. Posterior upper labials with black borders. Fifth and sixth lower labials with borders partially black. First two temporals brick red.

One specimen, from Clark county, is in the Kansas University

museum. It was collected by Prof. F. H. Snow in the spring of 1893. Professor Cragin collected one specimen at Garden City. One specimen from Medicine Lodge is in the museum of Washburn College.

CARPHOPHIOPS Gervais.

Carphophiops Gervais, Dict. Hist. Nat. Univers., per D'Orbigny, III, 1843, p. 191.

Carphophis Dumeril, Prod. Class. Ophid., 1853, pp. 43-46.

Celuta Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 129.

Scales smooth, in thirteen rows. No antorbital. One nasal. Head very small, depressed, not distinct from body. Eye small. Anal divided.

Carphophiops amœnus Say.

Worm Snake, Western Ground Snake.

Coluber amœnus Say, Jour. Acad. Nat. Sci. Phila., IV, 1825, p. 237.

Celuta amœna Baird and Girard, Cat. N. Amer. Rept., 1853, p. 129.

Carphophis amœnia Dumeril and Bibron, Erp. Gen., VII, 1854, p. 132.

Carphophiops amœnus and *C. vermis* Cope, Check-list N. Amer. Batr. Rept., 1875, p. 34.

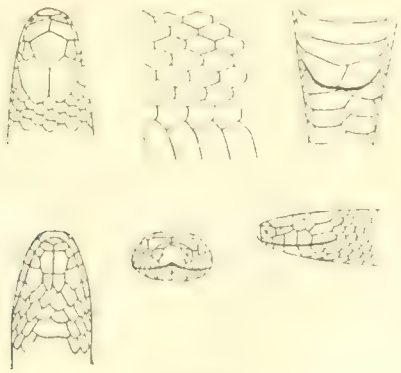

Fig. 27.
Carphophiops amœnus Say.

Scales smooth, in thirteen rows; first row broader than long. Occipitals short, broad. Frontal about as wide as long, hexagonal: occasionally the anterior angle is very large and the lateral margins are curved, meeting in a point behind. Superciliaries very short, broader posteriorly than anteriorly. Prefrontals short and wide. Internasals very small, concavo-convex, with the convex margin in front. Occasionally the internasals

are not present. Rostral very narrow, recurved above and excavated below. One long, narrow nasal; naris in the center. Loreal rectangular, narrow, entering the orbit. No antorbital; one postorbital. Five superior labials, fifth largest; eye above third and fourth. Inferior labials six, fourth largest. Pregenials larger than postgenials. Temporals 1–1 or 1–2. Gastrosteges very short, 125–150. Urosteges 23–36, in two series. Anal divided.

The following are the scutellation and dimensions of four specimens from Douglas county in the University museum:

Length, in.	Tail, in.	Gastrosteges.	Urosteges.	Scales.
10	$1\frac{3}{4}$	129	33	13
7	1	136	29	13
13	$1\frac{1}{2}$	145	26	13
5	$\frac{3}{4}$	146	32	13

Color above uniform, chestnut brown to black. Abdomen flesh-colored; this color reaches the upper part of the second row or the lower part of the third row of scales. Top of head lighter than the body. Upper labials flesh-colored to light brown.

I have examined specimens from Neosho and Douglas counties. One specimen, from Fort Scott, is in the National Museum. Rare in Kansas, but probably occurs throughout the eastern half of the state.

Little is known of its habits. It lives in damp places, under rocks, bark, decaying leaves, etc. Hay states that it is probably nocturnal. Holbrook says that it lives on insects.

Cope (10. 735) gives two species of *Carphophiops*, *amœnus* and *vermis*. He separates *vermis* from *amœnus* because it is darker, the light color of the belly extends to the third row of scales, and it has only one temporal in the second row. I have examined a large number of specimens, and they do vary as Cope says, but frequently the lighter-colored snakes have the light color of the belly extending to the third row of scales. One temporal in the second row is an anomaly that occurs occasionally with the dark-colored snakes.

DIADOPHIS Baird and Girard.

Diadophis Baird and Girard, Cat. N. Amer. Rept., Pt. I, 1853, p. 112; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, pp. 54–80.

Head normal, distinct from body. Maxillary teeth subequal. Two preoculars. Two nasals. One loreal. Scales smooth, in 15–17 rows. Anal divided.

KEY TO SPECIES.

Seventeen rows of scales; gastrosteges more than 200.....*D. regalis.*
Fifteen rows of scales; gastrosteges less than 200.....*D. punctatus.*

Diadophis regalis Baird and Girard.

Arny's Ring-necked snake.

Diadophis regalis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 115.

Diadophis regalis regalis and *D. regalis arnyi* Cope, Check-list N. Amer. Batr. Rept., 1875, p. 38.

Scales smooth, in seventeen rows; first rows broadest. Frontal subpentagonal, narrow behind. Superciliaries narrow anteriorly. Temporals 1–1. Oculars 2–2. Gastrosteges 200–240. Urosteges 50–75.

Color above greenish to dark brown. Belly reddish or yellow with many small black spots. Nuchal collar usually not present.

One specimen from Kansas is in the National Museum. I have examined two specimens from Riley county.

Diadophis punctatus Linnæus.

Ring-necked Snake.

Coluber punctatus Linnæus, Syst. Nat., 12th ed., 376.

Diadophis punctatus, *D. occipitalis*, *D. dysopes*, Cope, Proc. Acad. Nat. Sci. Phila., 1850, p. 250.

Diadophis punctatus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 112.

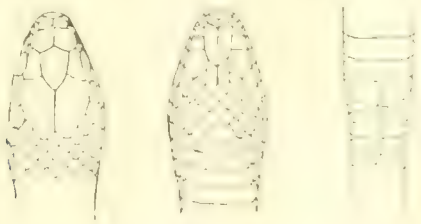

FIG. 28.
Diadophis punctatus Linn.

Scales smooth, in fifteen rows. Frontal subpentagonal, narrow behind. Parietals large, elongated. Internasals narrow. Two large nasals, nostril between them. Rostral broad. Upper labials eight (occ. 7). Lower labials eight, fifth largest. Temporals 1–1. Oculars 2–2. Gastrosteges 130–160. Urosteges, 35–60.

Color above greenish drab to brown; beneath bright red on tail, fading to light orange on the throat. Nuchal collar light orange. First three lower labials each with a small black spot. About ten small black spots on the chin. Gastrosteges with a small black spot near each end.

Rare in Kansas. I have examined specimens from Scott, Mitchell, McPherson and Wyandotte counties.

LIOPELTIS Cope.

Chlorosoma Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., p. 1853, 108.
Liopeltis Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 559.

Head distinct, scuta normal. Rostral plate not modified; one nasal. Teeth equal. Anal and caudal scuta divided. Scales smooth, unifossate. Size small.

Liopeltis vernalis De Kay.

Grass or Green Snake.

Coluber vernalis De Kay, Jour. Acad. Nat. Sci. Phila., V, 1827, p. 361.
Cyclophis vernalis Günther, Cat. Colubr. Snakes Brit. Mus., 1855, p. 119.
Liopeltis vernalis Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 560.
Contia vernalis Boulenger, Cat. Snakes Brit. Mus., II, 1894, p. 258.

Fig. 29.
Liopeltis vernalis De Kay.

Scales smooth, in fifteen rows. First row broad and short. Frontal long, narrow, tapering gradually to a point behind. Occipitals long and regular in shape, anterior angle acute. Parietals of medium size. Prefrontals much wider than long, their long axes oblique to the long axis of the head. Rostral wide, of moderate height. One long and narrow nasal, nare at upper edge and anterior to the middle. Loreal nearly

square. Preocular one, rectangular; postoculars two. Upper labials seven, second to fifth higher than long; third and fourth entering the orbit. Lower labials eight, fifth largest. Pre- and postgenials about equal. Gastrosteges about 150. Urosteges about 70, in two series. Anal divided.

Color above uniform sage-green, brighter toward the abdomen. Top of head bottle-green. Belly greenish white. Upper labials greenish white below, tops and most of last two green. Under part of head white.

Occurs throughout the state. I have examined specimens from Neosho, Barber, Montgomery, Pottawatomie, Franklin and Douglas counties.

ZAMENIS Wagler.

Zamenis Wagler, Syst. Amph., 1830, p. 188.

Coluber Schlegel, part, Phys. Serp., II, 1837, p. 125.

Bascanion Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 93.

Masticophis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 98.

Scales smooth, in fifteen to nineteen rows. Teeth increasing gradually behind. Anal plate divided; subcaudals in two series. Preoculars two, lower very small. Head distinct. Body long and slender. Young spotted or with cross bands.

KEY TO KANSAS SPECIES.

1.—Seventeen rows of scales; seven upper labials; black bluish or greenish above ..... *Z. constrictor.*

2.—Seventeen rows of scales; eight upper labials; brownish above. *Z. flagellum.*

Zamenis flagellum Shaw.

Zamenis flagelliformis Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 389.

Coluber flagellum Shaw, Gen. Zool., III, Pt. II, p. 475, 1802.

KEY TO SUBSPECIES.

I.—Head and shoulders brownish; color becoming lighter toward the tail. Young cross-banded. These bands usually persisting in the adults. *Z. flagellum flagellum.*

II.—Black, except the belly, which is pinkish or yellow (Cope). *Piceus* does not occur in Kansas..... *Z. flagellum piceus.*

Zamenis flagellum flagellum Shaw.

Coach Whip.

Coluber flagelliformis Holbrook, N. Amer. Herp., I, 1836, p. 107.

Masticophis flagelliformis and *Coluber testaceus* Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, pp. 98, 150.

Bascanion flagelliforme flagelliforme Cope, Check-list N. Amer. Batr. Rept., 1875, p. 40.

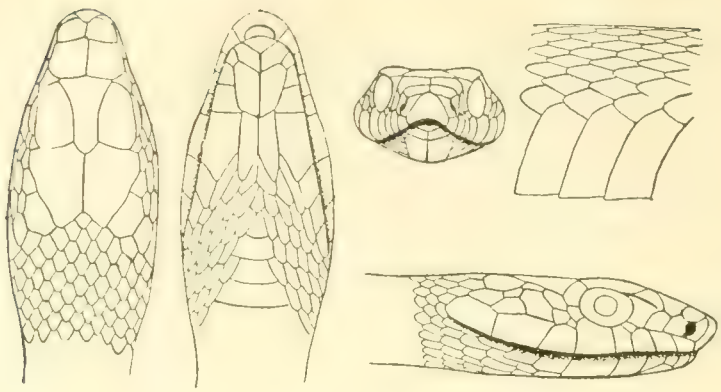

FIG. 30.
Zamenis flagellum flagellum Shaw.

Scales smooth, in seventeen rows; first row wider than long. Frontal narrow behind, flaring near the front. Superciliaries broad, pointed in front. Prefrontals narrow behind, wide in front; the outer posterior angle just meeting the anterior angle of the superciliaries. Internasals small, anterior margin convex. Rostral recurved above and excavated below. Anterior nasal large, the upper angle extending nearly to the median dorsal line. Posterior nasal smaller. Nostril mostly in anterior nasal. Loreal small. Superior angle of the upper antorbital reaching the frontal. Lower antorbital very small. Postorbitals two. Upper labials eight, fifth and seventh largest. Lower labials nine, fifth largest. Pre- and postgenials subequal. Gastrosteges 180–212. Urosteges 80–110. Anal divided. Subcaudals in two series.

Color above yellowish to dark brown, slightly darker anteriorly. The young are cross-banded. These bands persist, but become less conspicuous in the adult stage. Chin and throat white, usually a dark spot on each lower labial and genial. Belly yellow posteriorly, brown or spotted anteriorly. Top of head brown. Oculars yellowish. Each superior labial with a dark spot above.

Eye large. Head distinct from body. Body and tail very long and slender. Reaches an extreme length of six feet. It strikes viciously when disturbed, but is unable to inflict a serious wound on account of the shortness of its teeth. Its disposition is much like that of the Blue Racer.

Occurs throughout the southern and western part of Kansas. While collecting fossils in Scott, Logan and Gove counties in 1903 the writer saw more than twenty Whip Snakes during the month of July. They seemed to be more numerous than all of the other species combined. In August only fourteen specimens were seen, while more than twenty Rattlesnakes were collected. The writer collected one specimen of *flagellum* in Douglas county in May, 1903. This is the only specimen ever reported from the northern or eastern part of state.

Zamenis constrictor Linnæus.

Blue Racer.

Coluber constrictor Linnæus, Syst. Nat., I, 1766, p. 385.

Coluber flaviventris Say, Long's Exped. Rocky Mts., II, 1823, p. 385.

Bascanion flaviventris Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., p. 96.

Zamenis constrictor Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 387.

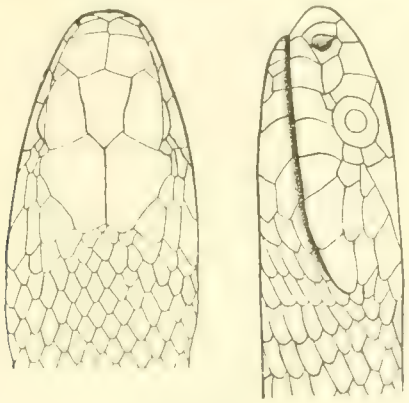

Fig. 31.
Zamenis constrictor Linn.

Scales smooth, in seventeen rows. Head distinct from body. Body long and slender. Frontal broad in front, much narrowed posteriorly; lateral margins concave. Supraoculars broad behind, slightly narrowed in front. Occipitals short, truncate, with an acute angle in front. Prefrontals large, slightly wider than long. Internasals almost elliptical, short and broad. Rostral triangular, high and wide. Loreal trapezoidal, higher than long. Preoculars two, the lower very small. Postoculars two. Temporals 2–2. Supralabials seven, sometimes eight. Infralabials eight, occasionally nine. Gastrosteges 170–185. Uro-

steges 66–100. Anal divided. Urosteges in two series. The following are the scutella and measurements of eight specimens in Kansas University museum:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges.	Scales.
16½	3¾	172	82	17
49	9½	181	73	17
14¾	3¾	187	82	17
34½	6½	181	66	17
36½	8¾	177	82	17
13½	8 1/16	177	83	17
43½	11	177	86	17
41⅛	9¾	174	81	17

Two specimens in the museum have two loreals on one side.

Color above uniform, ranging from greenish blue to black. The black variety is rare in Kansas. Greenish to yellowish below. Top of head brownish blue, becoming darker brown toward the snout; light brown on the side of the head in front of the eye. Lower half of the upper labials whitish, upper half bluish. Under part of head whitish.

This species is the most abundant in the state. It is more numerous in the central, middle and eastern parts than in the western. Its abundance is probably due to its ability to escape danger by its rapid movements and to its color blending well with both soil and shrubbery.

The Racer has been known to follow persons for a short distance, but it will flee if one advances toward it. There is a popular belief that it twines itself about persons' legs when attacking them, but the truth is that it never attacks unless one handles it. When captured the larger snakes strike vigorously. Frequently they remain in captivity for months without becoming tame. The young are very pugnacious. *Constrictor*, like many other harmless snakes, has the habit of vibrating its tail rapidly when excited. The tail's vibrating among dry leaves makes a whirring noise much like the rattling of a Rattlesnake. It feeds upon small mammals, toads, birds, eggs, insects, and other snakes. Verril writes of a *constrictor's* vomiting up a Copperhead and a toad. One that I had in this laboratory swallowed a small Garter Snake. Insects are probably its principal food. I have found as many as eight crickets in the stomach of a small Racer. Their habit of eating insects explains

their presence in large numbers in grain-fields, where insects are very abundant.

The young of this species are spotted. The ground color above is dark olive with a dorsal series of dark rhomboidal spots. Two rows of small dark spots on each side. Two to four reddish spots on each gastrostege. The outer spots cover the end of the gastrosteges, but a gastrostege usually has only one end thus covered, the opposite ends of adjoining plates being immaculate. The spots next the end spots are plano-convex and smaller. The head is marked like that of the adult.

I have examined specimens from Mitchell, Ellis, Scott, Republic, Logan, Cloud, Gove, Brown, Riley, Lyon, Franklin, Wallace, Shawnee, Douglas and Jefferson counties. It has been reported from Stanton, Montgomery, Miami, Harvey, Neosho, Greenwood, Osborne, Sherman, Phillips and Pottawatomie counties.

TANTILLA Baird and Girard.

Tantilla Baird and Girard. Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 131.

Homalocranium Dumeril and Bibron, Mem. Acad. Sci., XXIII, 1853, p. 490.

The generic description and the description of *gracilis* here given are taken from Cope's "Crocodilians, Lizards, and Snakes," 1110–1112.

Head depressed, continuous with body. Cephalic plates normal. Internasals and postfrontals two each. Posterior maxillary tooth grooved. Two nasals, nostrils in the anterior plate. No loreal. Anterior orbital one; posterior one or two. Eyes below the medium size. Body subcylindrical; tail short. Scales smooth. Postabdominal scutella bifid. Subcaudals all divided.

KEY TO KANSAS SPECIES.

Upper labials seven; head black..... *T. nigriceps.*
Upper labials six..... *T. gracilis.*

Tantilla gracilis Baird and Girard.

Graceful Tantilla.

Tantilla gracilis Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 132.

Homalocranium gracile Bocourt, Miss. Sci. Mex. Rept., 1853, p. 579.

Tantilla hallowellii Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 77.

Anterior and postorbitals one each. Color uniform greenish brown above, lighter beneath; head darker.

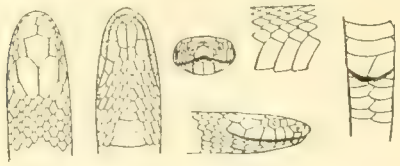

FIG. 32.
Tantilla gracilis B. and G.

Vertical plate subhexagonal, much shorter than in *T. nigriceps*. Postfrontals separated from the second upper labial by the postnasal. Nostril in the posterior part of the prenasal. Eyes very small, circular. Superciliaries proportionally smaller and narrower than in *T. nigriceps*. One antorbital and one postorbital, both angular. Mouth deeply cleft. Upper labials six; fifth and sixth equal, larger than the rest; third and fourth beneath the eye, entering slightly into the orbit anteriorly and posteriorly. Temporal shields two, narrow and elongated. Body slender and subcylindrical, covered above with subrhomboidal or elliptical and smooth scales, in fifteen rows. Outer row but slightly larger than the three succeeding rows. Tail very slender. Gastrosteges in type specimen 130, urosteges 45.

Cope (10. 113) says of the specimen described by Hallowell in 1856 as a variety of *gracilis* and given by himself as a new species, *T. hallowellii*, in 1860: "I think the supposed species represents only an extreme individual variation." The specimen described by Hallowell was collected in Kansas by Doctor Hammond.

One specimen of *Tantilla gracilis* from Wilson county is in the museum at Washburn College.

Tantilla nigriceps Kennicott.
Black-headed Tantilla.

Tantilla nigriceps Kennicott, Proc. Acad. Nat. Sci. Phila., 1860, p. 328.
Scolecophis fumiceps Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 371.
Hamalocranium praeoculum Bocourt, Miss. Sci. Mex. Rept., 1883, p. 582.

Fifteen rows of scales, all smooth. Internasals much wider than long. Prefrontals pentagonal, wider than long. Frontal hexagonal, margins slightly convex. Nostril in posterior edge of anterior nasal; postnasal pentagonal, in contact with preocular. Two postoculars and one preocular. Rostral visible

from above. Seven superior labials, seventh largest. Six inferior labials, fourth largest. Scales broad and short. Gastrosteges 130–165. Urosteges 46–66, in two series. Anal plate divided.

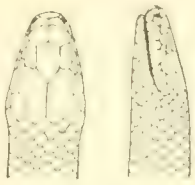

FIG. 33.
Tantilla nigriceps Kennicott.

Color gray to drab above, reddish beneath. Top of head black, the same color extending to the third scale behind the occipitals. Superior labials white below, bordered with black above. Inferior labials and under part of head white.

A small snake, seldom reaching a length more than twenty inches. Head not distinct from body, flat and sloping forward above. Body slender. Eye small, above third and fourth labials.

I have examined specimens from Barber, Riley, Clark, Gove and Hamilton counties. One specimen from Geary county is in the National Museum. This snake is rare in Kansas. Cope and Brown give northern Texas as the northern limit of its range.

It feeds on insects. Its favorite abode is under heaps of cattle dung. It lives in semiarid regions, but after a rain or heavy dew covers itself with slime, as though enjoying moisture to a certain degree.

CHIONACTIS COPE.

Chionactis Cope, Proc. Acad. Nat. Sci. Phila., 1861, p. 303.

Posterior maxillary tooth not enlarged, with a shallow external sulcus. Nasal plate single, pierced by the nostril, distinct from the labials. Internasals and preocular present Anal and subcaudal plates double. Loreal usually present.

Only one specimen of this genus has ever been reported from Kansas. It belongs to the species *episcopus*, and was collected by Professor Cragin.

Chionactis episcopus isozonus Cope.

Banded Miter Snake.

Contia isozona Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 304.

Contia episcopa torquata Cope, Bull. U. S. Nat. Mus., No. 20, 1880, p. 21.

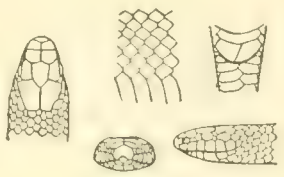

Fig. 34.
Chionactis episcopus isozonus Cope.

Two postoculars; six rows of gular scales. Rostral rounded, slightly produced backwards. Scales in fifteen rows, all smooth. Superior labials seven; the orbit bounded by the third and more largely by the fourth, Loreal small, quadrangular, longer than high. Oculars 1–2, anterior short, covered above by superciliary. Postoculars resting on fourth labial. Fifth and sixth labials equal, as high as long. Parietals large, long. Frontal longer than wide.

Prefrontals transverse. Internasals partly separated by rostral, which is not very prominent. Superior labials six, first pair meeting; fourth largest. Postgenials extremely short. Temporals little larger than body scales, 1–2. Muzzle obtuse; head scarcely distinct; eye small. Gastrosteges about 160. Urosteges about 40.

About twenty black half-rings, separated by equal spaces of pinkish ground color. About six black half-rings on the tail. Below immaculate, yellow to reddish.

CROTALIDÆ.

The *Crotalidæ* or Pit Vipers are represented in Kansas by four, possibly five, species. These are the only poisonous snakes that occur in the state. They may be distinguished from harmless snakes by the presence of a pit between the eye and the nostril, and by their having near the front of the upper jaw a pair of large, perforate, erectile fangs.

KEY TO GENERA.

I.—No rattle.....*Ancistrodon.*
II.—A rattle.
1. Top of head with plates.....*Sistrurus.*
2. Top of head with scales.....*Crotalus.*

ANCISTRODON Beauvois.

Toxicophis Troost, Ann. Lyc. Nat. Hist. N. Y., III, 1833, p. 190.
Ancistrodon Baird, Serp. N. Y., 1854, p. 13.
Agkistrodon Beauvois, Trans. Amer. Phil. Soc., IV, 1799, p. 381.

Nine cephalic plates. A pit between the eye and the nostril. A pair of erectile poison fangs. Scales keeled, in 21–27 rows. No rattle. Anal entire.

KEY TO SPECIES. (STEJNEGER.)

1. A loreal; orbit separated from supralabials by scales; usually 23 scale rows. *A. contortrix.*
2. No loreal; supralabials entering orbit; 25 scale rows.....*A. piscivorus.*

No specimen of *A. piscivorus* has ever been reported from Kansas, but every water snake found in our streams is called Water Moccasin. These harmless snakes have got a bad reputation from being aquatic. The poisonous Moccasin is easily distinguished from the harmless water snakes by the presence of the pit, by the erectile fangs, and by the thickness of the body.

I think it very probable that *A. piscivorus* occurs in southeastern Kansas, as it is found in southern Missouri and in Arkansas, and probably enters Kansas by way of the streams flowing from Kansas into these states. The description here given is taken from Stejneger.

Ancistrodon piscivorus Lacepede.

Water Moccasin.

Crotalus piscivorus Lacepede, Hist. Serp., II, 1787, p. 424.

Scytalus piscivorus Latreille, Hist. Nat. Rept., III, 1801, p. 163.

Coluber aquaticus Shaw, Gen. Zool., III, 1802, p. 425.

Toxicophis piscivorus Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp. 1853, p. 19.

Ancistrodon piscivorus Cope, Proc. Acad. Nat. Sci. Phila., 1859, p. 336.

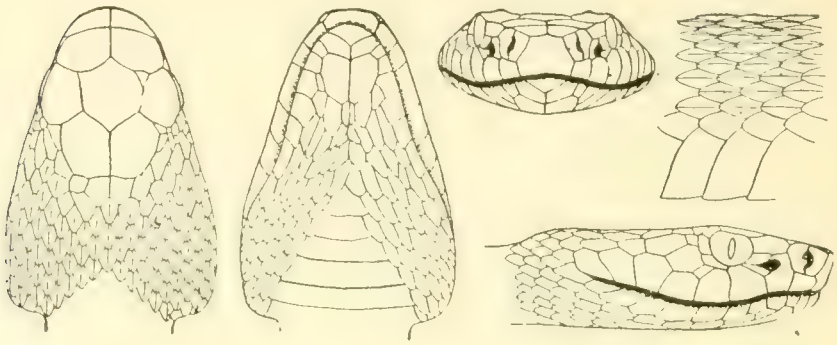

FIG. 35.

Ancistrodon piscivorus Lacepede.

No loreal. Inferior wall of orbit constituted by third labial; twenty-five dorsal rows. Dark chestnut brown, with indistinct vertical dark bars. Line from superciliary along the edge of the head, through the middle of the second supralabial row. A second line from the lowest point of the orbit parallel to the first.

Scales all large and well developed; those on the sides and back of head conspicuously so. Two nasal plates, with the nostril between them. Anterior orbitals two, one above the other; the upper extending from the eye to the posterior nasal, the the lower linear and forming the upper wall of the pit. Lower and posterior wall of pit constituted by a narrow plate resting along the third labial and terminating in the second. Third labial very large, constituting the inferior wall of the orbit, of which three scales form the posterior. Upper labials eight, very large and broad; lower ten. Occipitals terminated each by a triangular plate. All the scales on the back of the head carinated. Gastrosteges 130–145. Urosteges 39–45.

General color dark chestnut brown, with darker markings. Head above purplish black. An obsolete chestnut-brown streak passes from the posterior end of the superciliary along the upper

edge of the head, through the middle of the second row of supralabial scales. A narrow yellowish-white line passes from the third labial or begins just below the lowest part of the orbit, and passing backward parallel with the first stripe crosses the angle of the mouth at the seventh labial and meets the first stripe on the side of the neck, where it is confluent with yellowish white of throat. On the lower labials are three short, nearly vertical, light bars; on fourth, sixth, and seventh. The rest of the jaw itself, as well as the interval between the stripes on the sides of the head, dark purplish brown, of which color is also the space in front and below the eyes. General color above dull, dark chestnut brown. On each side a series of twenty or thirty narrow, vertical, purplish black bars one or two scales wide. Of these, sometimes two, contiguous to each other on the same side, are united into an arch, enclosing a space, the center of which is rather duskier than the ground color; at others corresponding bars from the opposite sides unite and form half-rings, encircling the body. Sometimes there is a lighter shade bordering the dark bars. Beneath black, blotched with yellowish white.

The Water Moccasin, as the name implies, is a water snake. Holbrook states that it is found about damp, swampy places or in water—far from which it is never observed. They attack everything that comes within their reach, erecting the head and opening the mouth for some seconds before striking. Their food is principally fish. They are ovoviviparous. Their poison is proportionally less virulent than that of the Rattlesnake and Copperhead, but on account of their large size they are dangerous. They sometimes reach a length of four feet.

Probably occurs in the southeastern part of Kansas.

Ancistrodon contortrix Linnæus.

Copperhead.

Boa contortrix Linnæus, Syst. Nat., I, 1766, p. 373.

Trigonocephalus contortrix Holbrook, N. Amer. Herp., III, 1842, p. 39, pl. VIII.

Agkistrodon contortrix Baird and Girard, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 17.

Ancistrodon contortrix Baird, Serp. N. Y., 1851, p. 13.

Head triangular. Cephalic scutella nine. Occipitals divided into several irregular scales posteriorly. Superior labials eight,

third and fourth largest. Inferior labials nine or ten. No superior labials enter the orbit. Dorsal rows of scales twenty-three, from nineteen to twenty-one posteriorly. Outer row of scales smooth, as wide as long, second row faintly keeled; all other dorsal scales strongly keeled. Two nasal plates; nostril in anterior plate. A deep pit between eye and nostril. Anal plate undivided. Urosteges in some specimens entire; in others the posterior divided, anterior entire. Antorbitals three. Postorbitals four to five. Tail short. Urosteges 30–50. Gastrosteges 145–155.

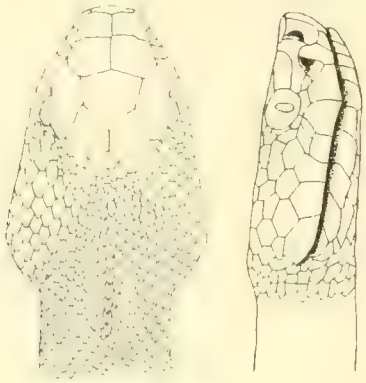

FIG. 36.
Ancistrodon contortrix B. and G.

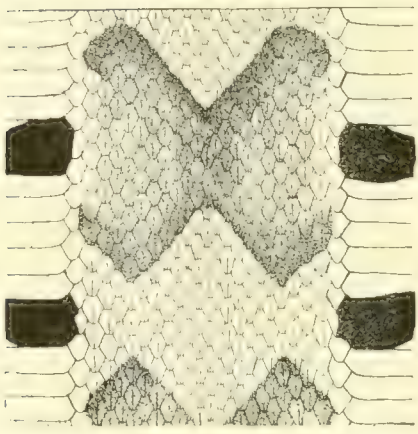

FIG. 36*a*.
Ancistrodon contortrix B. and G.

Color above light chestnut brown, mottled with very fine dark points. A series of dark brown markings above covering as much space as the ground color, from twelve to eighteen from head to anus, three on tail. Color beneath yellowish, with series of black blotches alternating with and opposite the brown markings of the dorsal surface. Head brown. Each parietal with a small brown spot. Labials light. A black thread-like band extends from the orbit around the angle of the mouth and reaches the third infralabial. Length two to three feet.

The following are the scutellation, formula and dimensions of five specimens in the University museum:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges	Scales.
$11\frac{3}{4}$	$1\frac{5}{8}$	150	46	23
$22\frac{3}{4}$	$2\frac{3}{4}$	149	44	23
$22\frac{1}{4}$	$2\frac{3}{4}$	146	44	25
$22\frac{1}{2}$	$3\frac{1}{4}$	152	46	23
20	$2\frac{7}{8}$	152	46	23

This snake is rare in the eastern part of the state and is not found in the western part. It lives in low ground, preferring timbered regions. It is more vicious than the Rattlesnake. It strikes without warning and seems to be always on the lookout for something upon which to use its fangs. It is less dangerous than the Rattlesnake, according to Doctor Mitchell, because its poison is less virulent. Doctor Yarrow (13. 422–435) states that of many cases recorded in medical journals he had found only one fatal case, the victim being a boy of six; however, some of the cases were very severe.

I have examined specimens from Douglas, Wabaunsee, Riley and Franklin counties. It has been reported from Neosho, Jefferson, Miami, Montgomery and Marshall counties. Since writing the above I have examined one specimen from Rooks county. This is the most westerly locality from which it has been reported.

SISTRURUS Garman.

Crotalus Linnæus, part, Syst. Nat., 12th ed., 1776, p. 372.

Caudisona Fitzinger, New Class. Rept., 1826, p. 63.

Sistrurus Garman, N. Amer. Rept., 1883, p. 110.

Nine symmetrical head plates. Tail with rattle at extremity. A pair of large erectile fangs in front of maxillæ. Loreal pit present. Scales keeled, from twenty-one to twenty-five rows.

KEY TO SPECIES IN UNITED STATES. (BROWN.)

Postnasal in contact with preocular; the light line to angle of mouth begins at nostril ..... *S. catenatus.*

Postnasal separated from preocular by loreal; light line to angle of mouth begins at the eye ..... *S. miliartus.*

Sistrurus catenatus Garman.

Prairie Rattlesnake or Massasauga.

Caudisona tergeminus Wagler, Nat. Syst. Amph., p. 176.

Crotalus tergeminus Say, Long's Exped. Rocky Mts., I, p. 499.

Sistrurus catenatus Garman, N. Amer. Rept., 1883, p. 118.

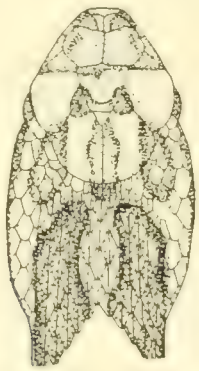

FIG. 37.
Sistrurus catenatus Garm.

Rows of scales 23–25; outer row not keeled, second row keeled only at the base or not at all. Outer margin of the occipitals rounded. Occipitals broad posteriorly, narrow anteriorly. Considerable variation appears in these plates. In some specimens they are narrower posteriorly than anteriorly and lose their rounded outline. Frontal triangular with gently convex margins, in the type specimen. This plate also presents many variations. In a specimen now before me it is regularly pentagonal. Frequently it is truncated at the apex and the separated part remains as an extra plate. Superciliaries large, broad in the middle and narrow at the ends. Prefrontals with only one sharp angle; the outer margin rounded. Internasals triangular, anterior margin convex, posterior margin concave. Rostral high and narrow, broadest near the lower edge. Two nasals, anterior rectangular, narrow and high; posterior almost triangular. Nostril very small. Preoculars long and irregular, the upper reaching nearly to the internasal. Loreal small and irregular in shape. Superior labials 10–12. Inferior

labials 12–15. Gastrosteges 135–155. Urosteges 20–32. Anal entire. Subcaudals undivided.

Color above gray or brownish, occasionally black. There are three series of dorsal blotches. These blotches are grayish brown to blackish internally and have a narrow black margin. The black is bordered externally by a narrow yellowish margin. The superior spots are large and obovate in shape. The lateral spots are smaller and rounded, but are of the same color as the dorsal series. The belly ranges in color from yellowish to black. The most frequent color marking is a yellowish ground color maculated with many large black blotches. A dark brown stripe with narrow black margins extends backward from the eye onto the neck. A narrow yellowish streak extends from the nostril backward to the angle of the mouth. The anterior part of the lower jaw is black. The fifth, sixth and seventh lower labials are partly yellow. A narrow yellow stripe runs downward from the pit. The accompanying drawing shows the color marking of the top of the head.

By most herpetologists this species is divided into two subspecies. The characters upon which this division is based are not constant. Kansas is the northern limit of the southern variety and the southern limit of the northern variety, but in Kansas specimens there are no markings constant enough to warrant the division into subspecies. It varies enough to include both varieties, but the series of variations is complete. A specimen now before me agrees with *catenatus* in head plates and the shape of the head, but has but fifty-three spots. Other specimens having the head plates of *edwardsii* have less than forty spots, and the scales are in twenty-five rows.

This snake is not as large as *confluentus*, seldom exceeding thirty inches in length. Its poison is no less virulent than that of the larger snake. I have known personally of several persons being bitten, and the results were always serious. In one case the victim, a child of five years, died.

The Massasauga or Prairie Rattler is a truly prairie snake, but it is found in largest numbers on low, sandy soil near rivers and small streams. I have examined specimens from Republic, Cloud, Mitchell, Clay, Wabaunsee, Leavenworth, Brown, Franklin, Shawnee and Lyon counties. It has been reported from Montgomery, Harvey, Neosho, Greenwood, Osborne and Pottawatomie counties. During one summer's collecting in

Logan, Gove and Scott counties I did not see a specimen of *Sistrurus*. Dr. S. W. Williston, who has spent six summers on the plains of western Kansas, informs me that he never saw a specimen of *Sistrurus* there. If it occurs in the western part of the state it is rare. Abundant in middle part of state. Rare in eastern part.

CROTALUS Linnæus.

Crotalus Linnæus, Syst. Nat., 10th ed., 1758, p. 214; 12th ed., 1766, p. 572.
Caudisona Laurenti, Spec. Syn. Rept., 1868, p. 92.

A jointed rattle at the end of the tail. The top of the head covered with scales. Head broad and neck contracted; subcaudals not divided.

Only two species of this genus are found in Kansas. These snakes are much larger than the *Sistrurus* and are consequently more dangerous.

I.—Tail black; dorsal pattern consisting of dark, double-chevron-shaped bands. A dark-colored snake..... *C. horridus.*

II.—Tail with brown or indistinct bands. Three rows of dark dorsal spots. A light postocular band reaches the second row of scales above the angle of the mouth. A light-colored snake..... *C. confluentus.*

Crotalus horridus Linnæus.

Banded or Timber Rattlesnake.

Crotalus horridus Linnæus, Syst. Nat. 12th ed., I, 1766, p. 372; Cope, Proc. Acad. Nat. Sci. Phila., 1859, p. 338.
Crotalus durissus Latreille, Hist. Rept., III, 1801, p. 190.

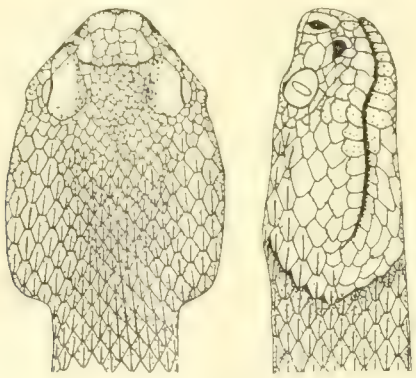

Fig. 38.
Crotalus horridus Linn.

Rows of scales 23–25, all strongly keeled, excepting the first two rows, which are faintly keeled. Top of head covered with

directed outward. Superciliaries large and irregular in shape. small scales. Internasals triangular, the more acute angle Prefrontals small, touching the internasals in front and the superciliaries behind; between the prefrontals are several (3–7) small plates. The anterior nasals are small, rectangular, in contact with the rostral in front. The posterior nasal contains the nostril. It is smaller than the anterior and is subcircular. Rostral narrow and high. Supralabials 12–14, first and fourth or fifth largest. Infralabials 13–17, first largest. Two preoculars, lower generally crowded out of the orbit. It usually reaches the pit. The upper preocular is larger than the lower. Anterior to this are two or three small loreals. The upper labials are separated from the eye by three rows of scales. Postgenials not present. Gastrosteges 165–180. Urosteges 20–30. Anal entire. Subcaudals undivided.

Ground color above yellowish to dark brown, maculated by five rows of dark spots, generally confluent posteriorly. The dorsal spots are large, about ten scales wide and five scales long. Alternating with these is a row of very small spots generally covering a small portion of four scales. Opposite the dorsal spots is a row of large diamond-shaped spots. These slightly encroach upon the gastrosteges below. Alternating with these is a row of small light-colored spots on the margin of the gastrosteges. There are about twenty-one spots in each row. The tail is black above, lighter below. The belly is whitish in the middle with many small dark spots near the ends of the gastrosteges. Labials mostly white; 4–7 lower labials marked with black. A dark band extends from the orbit around the angle of the mouth.

This species is not numerous in the eastern part of the state, and I have no evidence of its occurrence in the western part. The Banded Rattlesnake is exceeded in size only by the Diamond Rattlesnake. The largest specimen in the Kansas University museum is fifty inches in length. Cope reports a specimen five feet in length. The body is very thick. One in the University museum is eight inches in circumference.

C. horridus is called the Timber Rattlesnake because of its preference for wooded districts. It sometimes climbs trees but usually stays among rocks and fallen timber. It is sometimes found far from timber in the open fields and prairies. It is sluggish in its movements and does not strike unless irritated.

It feeds upon rats, mice, birds, young rabbits, and other small animals.

The following are the dimensions and scutellation of six specimens in the museum of Kansas University:

Length, in.	Tail, in.	Gastro-steges.	Uro-steges.	Scales.
40	$2\frac{1}{2}$	172	24	23
26	$1\frac{1}{2}$	174	23	23
50	$3\frac{1}{2}$	170	28	23
40	$2\frac{1}{4}$	172	23	23
47	3	176	24	25
42	$2\frac{3}{4}$	173	21	25

I have examined specimens from Douglas, Brown, Franklin, Riley and Wabaunsee counties.

Crotalus confluentus Say.

Confluent or Prairie Rattlesnake, sometimes called Massasauga.

Crotalus confluentus Say, Long's Exped. Rocky Mts., II, 1823, p. 48.

Crotalus confluentus Stejneger, Rept. U. S. Nat. Mus. for 1893, 1895, p. 440.

Crotalus confluentus confluentus and *pulverulentus* Cope, Crocodilians, Lizards, and Snakes, 1898, p. 1170.

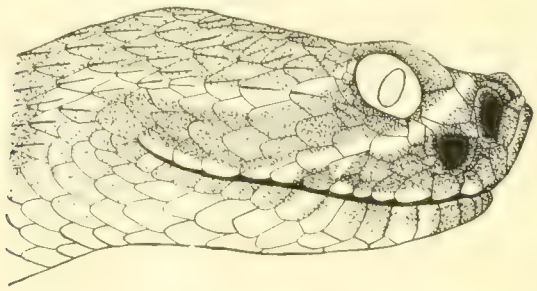

FIG. 39.
Crotalus confluentus Say.

Scales in 23–27 rows. First and second rows faintly or not keeled; a few dorsal rows strongly keeled. Superciliaries large, projecting above the eye. Prefrontals small, overlapping the superciliaries. Internasals smaller than in *horridus*. Between the internasals two horn-like scales and several smaller scales; all the remainder of the top of the head covered with scales. Rostral higher and slightly wider than in *horridus*. The anterior nasal is almost square. Posterior nasal ear-shaped. Nare is in the anterior part of it. One or two small loreals. Four rows of scales between the eye and the labials. Supralabials 13–16.

Infralabials 14–18. Pregenials broad and short. Gastrosteges 170–190. Urosteges 20–30. Anal entire.

Grayish to brownish above, with a dorsal series of large rhomboid-oval spots. The spots have dark brown borders and are lighter in the middle. The dark scales forming the spots often have very narrow light borders. Alternating with the dorsal spots are smaller, much lighter colored spherical and oval spots. These become opposite and coalesce with the dorsal spots on the tail, forming cross-bars. The belly is yellowish with gray at the ends of the gastrosteges. The under part of the head is whitish. The labials are marked with very dark gray to brown. The top of the head is brown. A light stripe extends from the upper posterior angle of the orbit backward around the angle of the mouth. A light stripe extends from the upper part of the posterior nasal plate to a little behind the middle of the maxillary. The lower edges of the upper labials are white. The temporal scales are margined with white.

This species is quite numerous in the western part of the state, but is not found in the eastern part. I saw twenty-six specimens while collecting for two months in Gove, Logan and Scott counties. It is found in considerable numbers in prairie-dog towns. It feeds upon prairie-dogs, gophers, and other small animals. It does not live in peace with the prairie-dogs, as so many people believe, but is their deadly enemy. The young dogs are its special prey. It protects itself by retreating into the holes of the prairie-dogs. It seldom reaches a length of more than three and one-half feet. The largest specimen that I ever examined was one that I killed in Gove county, three feet four inches long and six inches in circumference. On account of its size and disposition it is not as dangerous as *C. horridus*. I never saw one of these snakes strike unless it was injured. It does not hibernate until late in the year, often being met with as late as the middle of November.

Manhattan is the point farthest east from which it has been reported. Manhattan is the point farthest west from which *C. horridus* has been reported. It would seem that the range of *C. horridus* ends at about the place where the range of *C. confluentus* begins. *Sistrurus* occurs in greatest numbers along the border line where the larger snakes are rare.

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GLOSSARY.

Anal plate.—The large scale in front of the anus in snakes.

Antorbital.—A small plate which lies immediately in front of the eye.

Azygous.—Single. Not one of a pair.

Carinated.—With a keel or sharp ridge.

Frontal.—The large plate on the top of the head between the superciliaries.

Gastrosteges.—Large plates along the belly.

Genials.—Large scales behind the mental.

Infralabials.—Plates on the lower lip.

Internasals.—Scales just behind the rostral.

Keel.—A ridge along a scale.

Labials.—Plates on the lips.

Loral.—See Loreal.

Loreal.—The plate occupying the space between the nasals and the preoculars.

Maculate.—Spotted.

Occipitals.—Plates behind the frontal and superciliaries.

Parietals.—See Occiptals.

Postgenials.—Posterior pair of genials.

Postoculars.—Plates bounding the orbit behind.

Prefrontal.—Plates just in front of the frontals.

Pregenials.—Anterior pair of genials.

Preocular.—Plates bounding the orbit in front.

Rostral.—Plate at the tip of the snout.

Scute.—A scale.

Superciliary.—The plates above the eyes.

Supralabials.—Plates on the upper lip.

Supraocular.—Same as superciliaries.

Urosteges.—Large plates on the lower surface of the tail.

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